Growth, private investment and reforms : A comparative perspective

Ghazouani Kamel*

July , 2005

Abstract

In this paper we empirically analyse the linkages among growth, investment and reforms in the South East Asian countries, in the North Africa and in the non CFA Sub-Saharan Africa economies over 1970-89 to 2003. These regions differ considerably among them selves as well as with regard to the rest of the world, in terms of resources endowment, structure of production , and also in terms of economic reforms , physical infrastructure, and human capital. Our empirical analysis has clearly revealed the importance and the complementarities between macroeconomic reforms, physical infrastructure, human capital and structural reforms for the growth prospects of the economies. These factors have shown a strong effect on growth and have contributed greatly to the growth process for north Africa countries and the non CFA sub Sahara African countries. In north Africa economies and in the Sub Sahara African countries, the lack of macroeconomic reforms, the deficiencies of the physical infrastructure and the human capital explain, although at differing degrees , well the deficit in economic growth. This has been particularly the case of road networks, electronic equipments, sanitary conditions and schooling. The model simulation shows that an improvement of secondary schooling and physical infrastructure, similar to South East Asia, would have stimulated North Africa economic growth by respectively 0.61percent and 0.17 percent against only 1.23 percent and 0.39 percent for non CFA Sub Saharan Africa.

Keys words: Growth , reforms, Human capital , Structural reforms, macroeconomic stability, PCA, investment, Panel

JEL: C23-C82-E17-O40

* Dr.Ghazouani KAMEL
Professor of economic , Trade hight School of Tunis, Manouba University .
Address: B.P. 112 Menzah IX 1013 Tunis , TUNISIA
Email : kamel.ghazouani@fsjegj.rnu.tn
TEL/FAX 00216 98 357 897 / 00216 71 829 105

Growth, private investment and reforms : A comparative perspective

GHAZOUANI Kamel
July,2005

According to traditional growth theory, the main determinants of long run economic growth are not influenced by economic incentives. In the beginning of the ninetieth years, however, the study of economic growth has been reinvigorated by new developments in theory and empirical findings that suggest growth is in the sphere of policy. This new literature , referred to as endogenous growth theory, helps to explain movements in long term growth and why some countries grow faster than others.

Growth is a complicated process, but the main theories of economic growth are conceptually simple . There are basically two categories of economic growth theories. Those based on the traditionally Solow (1956) growth model and those based on the concept of endogenous growth :

- The Solow model emphases capital accumulation and exogenous rates of change in population and technological progress. This model predicts that all market-based economies will eventually reach the same constant growth rate if they have the same rate of technological progress and population growth . More over , the model assumes that the long run rate of growth is out of the reach of policymakers.
- The recent proliferation of endogenous growth models began with the work of Paul Romer (1986). (1986) observed that traditional theory failed to reconcile its predictions with the empirical observations that , over the long run, countries appear to have accelerating growth rates and, among countries, growth rates differ substantially. Endogenous growth theories are based on the idea that long –run growth fis determined by economic incentives. The most popular models of this type maintain that inventions are intentional and generate technological spillovers that lower the cost of future innovations . Naturally , in these models an educated work force plays a special role in determining the rate of technological innovation and long run growth .

This paper explores the relationship between growth, investment and reforms in the South East Asian countries, in the North Africa and in the non CFA Sub-Saharan Africa economies. More precisely, compared to the ASE, in this paper we try to understand whether the growth performance of these regions has been disappointing because North Africa and Sub-Saharan economies have lagged behind in terms of reform or because of the investment insufficiency .

The analysis of long term growth factors draws on a growth regression on a panel of 18 developing countries, spanning 30 years from 1970-89 to 2003. The list of countries is presented in annex 1. The regression explain average growth of per capital GDP over the period 1979 to 1989 and the annual growth from 1990 to 2003.

South East Asian economies (ASE), North African (AN) and non CFA sub-Saharan African economies (ASS) differ considerably among them selves as well as with regard to the rest of the world , in terms of resources endowment and structure of production , and also in terms of economic reforms , physical infrastructure, and human capital. The five composite growth indicators that we retain are : The macroeconomic stability (MS), the structural reforms (SR), the human capital (HC), the physical infrastructure (PI) and the private investment.

All our variables come from the World Development Indicators (WDI) of the World Bank, the interest rates and the private credit from the International Financial statistics of International Monetary Fund while economic reforms (MS,PI,HC and SR) are our calculation using also WDI statistics with the PCA method (See annex n° 2 for the PCA).

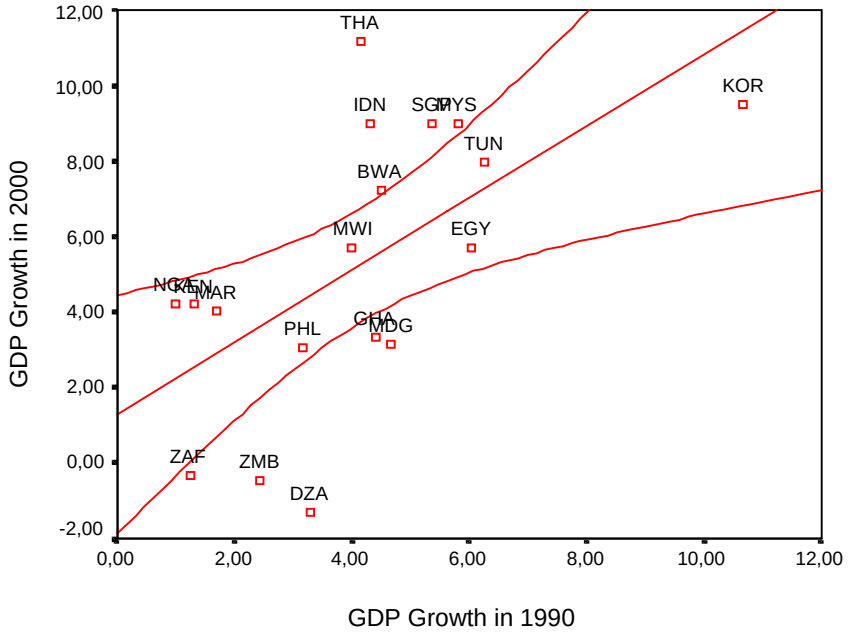
This paper synthesizes four composite indicator MS, SR, HC and PI . these indicators were constructed as the weighted sum of one or two principal components, depending of the explanatory power of each component. Following NABLI (2004) and VAROUDAKIS (2004), we choose the most significant principal components whose eighenvalues were higher than one. The detailed principal component analysis results are reported in annex 2.

The first section analysis the countries growth behaviour . section II discusses the data set for the four composite indicator of economic reforms , while section III presents the main results of the econometric analysis relative to the growth determinants. We test for a simulation of the African countries economic growth by including the Asian reforms.

I- Historical perspective on economic growth

Economists tend to think that differences in relative economic growth levels across countries will decline over time (See figure 1). Economists like MADDISON (1991) and DAVID ,M.G. & ROY,J.R. (1993) looked out on a world where the industrial revolution had opened huge relative wealth gaps between northwest Europe and the rest of the world (including Asia and Africa economies) . But they hoped and expected this wealth inequality to be transitory. The spread of democracy, education, and liberalism would soon make the cruel and inefficient tyrannies that kept much of the world impoverished things of the past. Population pressure would cease to be an important cause of human misery with the spread of birth control. Resource scarcities would lose their significance with the advance of technology.

Figure 1
Nominal GDP Growth Scatter chart (%)



Thus the economic logic behind the proposition that the world's economies should draw together in productivity levels is very powerful. Some economies are today better than others at adding to the store of technologies and techniques. And some are better than others at using the storehouse. But all should be trying very hard to learn, and as they learn their productivity levels will draw closer to those found in the world's industrial leaders. In many ways, this optimistic forecast of "convergence" was correct unless we see the partial working-out of the process over the past century. The industrial revolution did give north-western Europe an enormous edge in terms of productivity and technology. The technologies of the industrial revolution did diffuse. Americans travelled to Britain, hired technologically-skilled workers, spied out factories, and successfully copied British textile technologies in their own factories. The flows of ideas, organizations, and machines across national boundaries, and the rises in productivity generated by this diffusion of technology have been principal features of twentieth century economic history.

Yet the distribution of the world's wealth between nations appears more unequal today than any time else. This is not to say that poorly-performing economies have stagnated in absolute terms. South East Asians economies , for example, were one of the world's economic disappointments in the beginning of the twentieth century. But national product per worker today is perhaps five times what it was in 1900; only relative to growth achieved in today's in other countries lets Africa’s economies been disappointment.

Despite the recent slowdown in economic growth, long run growth not only has persisted since the early nineteenth and twentieth century but has accelerated . MADDISON (1991) has documented the persistence and acceleration of economic growth for 14 advanced capitalist countries (Annex 0).

For our sample in this study , between 1989 and 2003, the annual growth rate for North Africa countries was 3.36 percent , those for Non CFA Sub-African economies and the Asian’s one are successfully 2.43 percent and 5.64 percent. Table I compares the GDP growth for different regions and different periods.

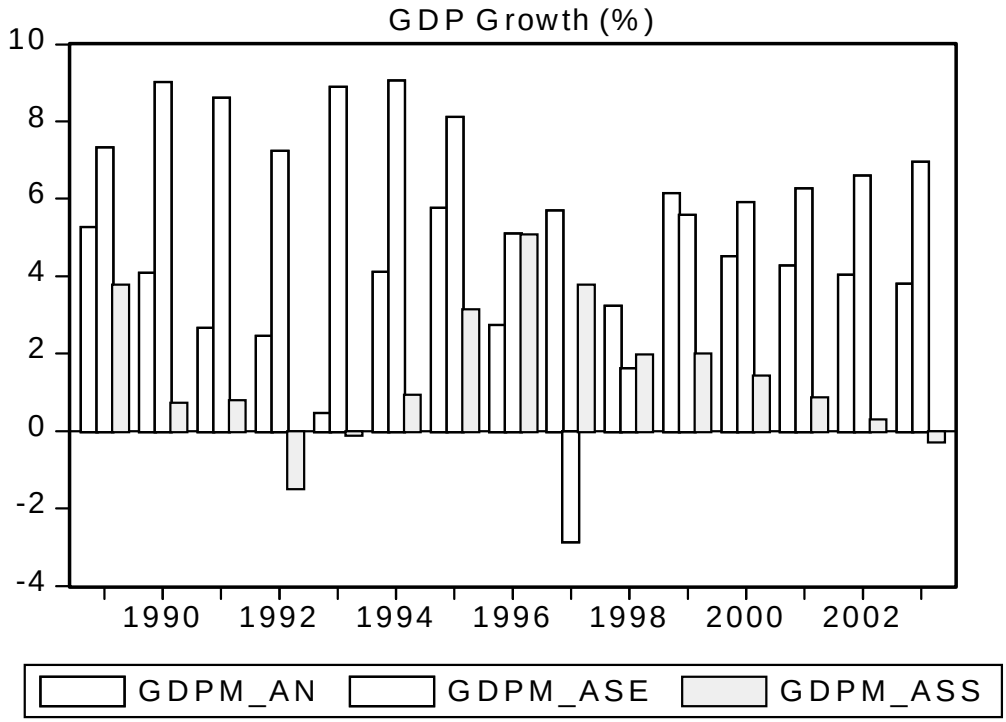
Table I: GDP growth rates (%)

Period	East Asia & Pacific		MENA		Sub-Saharan Africa		World
	Region	Sample	Region	Sample	Region	Sample	
1970-89	7.31	6.99	3.31	5.27	3.07	4.38	3.60
1990-03	7.22	5.64	3.69	3.36	1.86	2.43	2.44
1970-03	7.27	6.31	3.50	4.31	2.47	3.40	2.47

Source : Our calculation from WBI

The growth and wealth of Asian countries in the end of the twentieth century seem to be based on the quality of their institutions and technologies, and their political-economic institutions and industrial technologies were not in the beginning private property: they were "public goods." Anyone literate could read about, and anyone could observe the workings of the processes that made the Asian industrial rich. The right metaphor to use in thinking about the sources of industrial wealth was not the metaphor of a secret recipe for prosperity, but the metaphor of a storehouse, at least potentially open to all, of technologies and techniques that had been and were being developed (Figure II).

Figure II



II- Reforms in the South East Asian countries , in the North and in the Sub-Saharan African countries

II.1/ Macroeconomic reforms: The macroeconomic stability (*MS*) represents the risk for an economy to promote public investment and to encounter difficulties in reimbursing its debt and, it shows the economic external position fragility (See FISCHER (1993)).

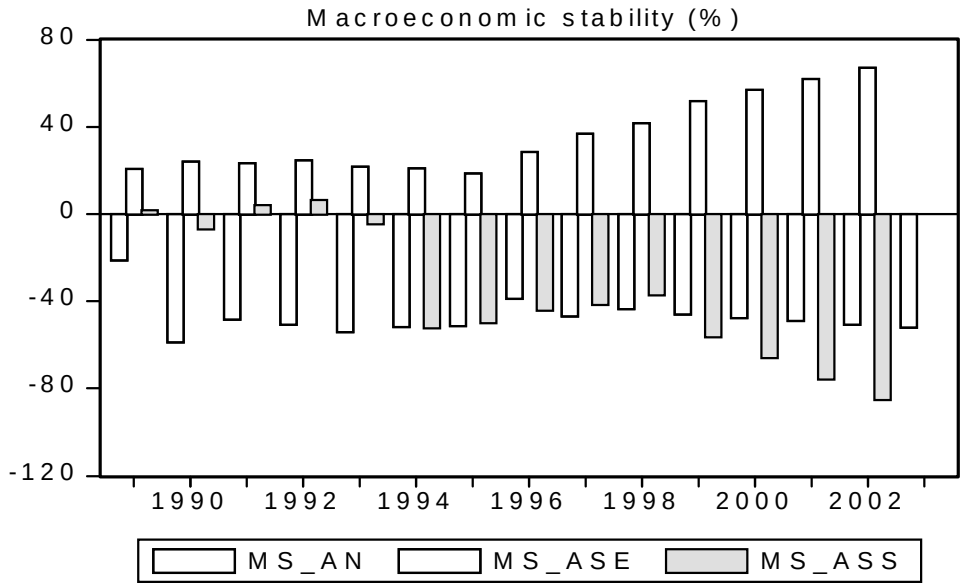
Macroeconomic stability is measured by an indicator comprising:
- Inflation that we denote (*P*),
- The public deficit as a percentage of GDP (*Defg*),
- The ratio of external debt as percentage of GDP (*Deb*)

The existence of a framework of healthy macroeconomic orientations characterized by weak and bearable budget deficits, a moderate inflation and a rate of external debt as a whole competitive is one of the essential elements of what constitute a carrying climate for the growth and the private investment . Macroeconomic stability in ASE region could, over the period 1989 to 2003, however, have been improved more compared to AN and ASS region (See figure III). After a relatively stability period between 1989 and 1994, the ASS countries faced great instability compared to other region. this instability can be explain by the public and the external debt deficit since 1995 while all countries of our sample have successfully contain inflation. The annex 3 shows also that ASE countries have the lower rates of the macroeconomic stability indicator : the mean inflation rate over the period is 6.58percent for ASE, 33.3percent for ASS and 10.4 for AN ; the budget deficit rate is successfully 37percent, 80percent and 63percent . the African countries are more exposed than the majority of the south east Asian countries to the risks of the terms of payment . Their unfavourable evolution

during the major part of the Eighties and with the beginning of the Nineties had a negative impact on the economic results. Similar state of things contributes in particular to difficulties of balance of payments, which has for negotiable instrument, in its turn, to discourage the investment by thus giving an image reinforced instability of the economic climate.

Continuation of contradictory orientations, backings and lack of determination in the implementation of the reforms and of well directed policies in African countries cause to discourage the growth.

Figure III



II.2/ Structural reforms: The structural reforms (*SR*) indicator shows that trade reforms can be at the origin of economies of scale of productivity gains due to increased competitiveness and increased access to larger markets and the development of the banking system , witch can have a positive effect on productivity to a better selection of investment projects and to higher technological specialisation through a diversification of risks (See NABLI (2004)). The structural reforms constitute an important determinant of the actual and future profitability of private investment.

The structural reforms index is measured by indicators that includes:

- An indicator of trade policy (*Com*) calculated as the ratio of import plus export to GDP,
- The ratio of private sector credit to GDP (*Cre*)

In terms of structural reforms, the ASS countries seem, since 1995 , to have performed relatively well compared to ASE region who known the crises at the end of the ninetieth years. Trade openness has been often particularly low for ASS and AN, the mean of trade policy rate over the sample is similar for these two regions, around 62 percent , and is by far after the ASE one. Trade openness differs between countries in the same region: we have to distinguish the non oil producing countries (Tunisia, morocco…) from the oil producing countries (Algeria, Nigeria…) whose trade openness has remained week due to the difficulties

in moving from state-dominate management of their economies and to diversify their exports. The sub Saharan African region suffer than the other region of lack of means of financing: The mean ratio of private sector credit to GDP for ASS is 29 percent , for ASE 91percent and for the North Africa countries represents 41percent of the GDP (see annexe 3).

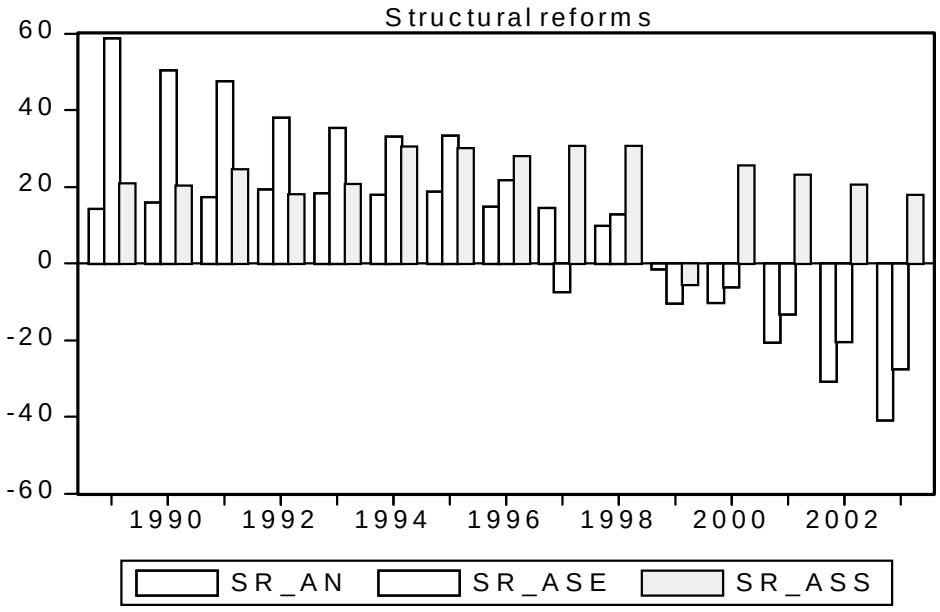
Sub-Saharan Africa continues to receive the major part of its flows of private capital of the countries of Western Europe and North America which are its traditional partners for the development and the trade. Reflection, primarily, of practices woven by the history as well as of relations commercial of more recent origin, two countries (France and the United Kingdom) have represented more than 60 percent of the investment of OECD in countries of Africa sub-Saharan during first half of the Nineties. The United States provided 15 percent approximately total of flows of foreign direct investment (FDI), and Japan a little more than 5 percent. the major part of the new FDI carried out in Africa is it fact of investors already established in the area. Two recent evolutions are however to announce: first of all, the fact that, these last years, sub-Saharan Africa received significant flows of private capital of developing country of Asia (ASE) and, second, the fact that flows of investment recorded intra-African were, also, in augmentation.

Asian flows of foreign direct investment bound for Africa strongly have increased from 18 million dollars in 1990, they reached 200 million in 1994, principal sources being the Republic of Korea, China and Malaysia. This tendency doesn't continues, at least on the levels reached since 1997, because of the majority Asian countries financial crisis. As for flows intra-African, they have primarily as a source South Africa, for what it is advisable to add the activity which deploy in this respect, for some time, certain Nigerian's firm.

The foreign private investment in sub-Saharan Africa goes mainly with the primary sector, and that much more than in any other area of the developing world. As much to say that the share of the sectors tanker and mining was there prevalent and, consequently, that countries equipped with resources oil and mining have, as a whole, summer the principal recipients of FDI flows bound for the area. However, even in the oil and mineral resources exporting countries, flows of FDI finance it more and more secondary industry as well as tertiary. In Nigeria, for example, which joint with oil possession the existence of a vast domestic market, the oil and gas sector did not represent, in 2000, that 35 percent of the inventories of FDI of the country, whereas it manufacturing sector and that of the services absorbed some, respectively, 48 percent and 19 percent. In South Africa also, last decade, most significant recipients of flow of FDI included the food sector, the components for engines and cars, information technologies and services.

For north Africa countries and the south east Asian economies, our finding do not mean that these economies have benefited from the banking system or from a developed financial system. Our results might be due to the fact that the proxy used for the private credit was unable to capture either the quality of the banking system witch could be better analysed , for example, by taking into account the quality of loans, the ratio of reserves of the banks; or the development of the financial market witch is efficient for the Asian countries of our sample.

Figure IV



II.3/ Human capital: For LUCAS (1988), MANKIW, ROMER et WEIL (1992), health and education exert a positive externalities by increasing the productivity of physical capital ;

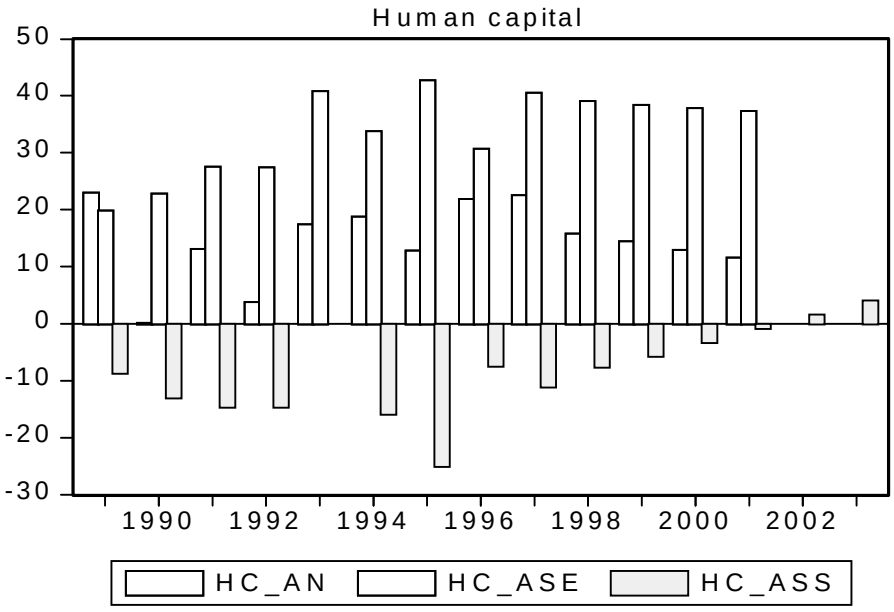
Human capital accumulation (*HC*) measured by indicators composed of :

- The infant mortality rate (*Mor*) as a proxy of health condition,
- The number of secondary schooling of the population (S*ch*).

Labour qualifications, possibilities of formation that labour offers and its productivity are important for the investor and then for growth, because they have a direct incidence on the expenditure, the receipts and there profitability of its business. The educational level in general, regulation of work and the discipline of labour, all that influences the productivity and there competitiveness. The human resources of the host country are more determining than its natural wealth for the long-term viability of the investments and for there international competitiveness of the firms.

During the period 1989-2003, North Africa and ASE countries significantly improved their level of human capital (see figure V) . If progress was one of the best across regions, however , the mean level of human capital in sub-Saharan Africa was still lower than in NA and ASE; it represents –14percent against successfully 6percent and 27percent . Mortality rates has been reduced in ASS from 107 ‰ in 1989 to 81 ‰ in 2003 . Except to Egypt, levels are now in line between AN and South east Asia, its around 21 ‰ (Annex 3).

Figure V



II.4/ Infrastructure: BARRO (1996) consider that the complementarities between physical infrastructure and human and physical capital lead to higher productivity and increase the incentives to invest.

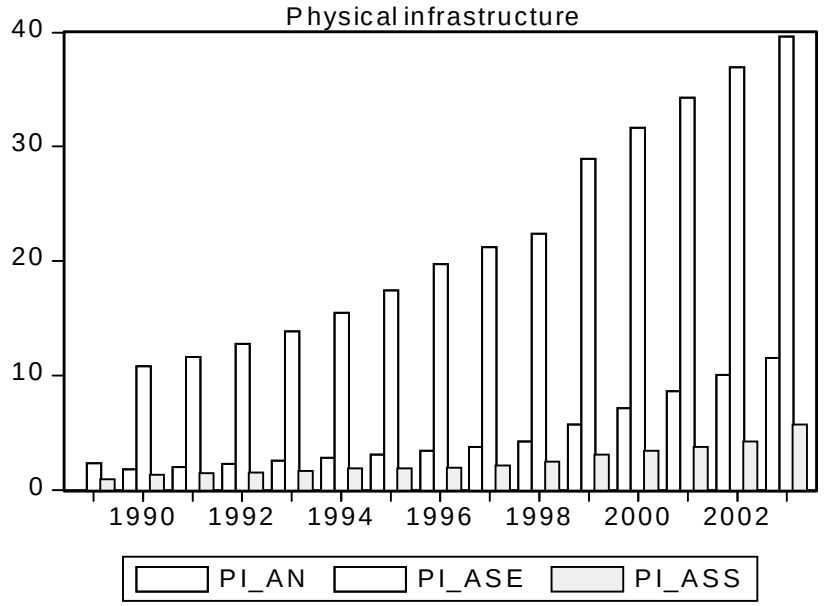
Physical infrastructure (*PI*), based on the logarithm of :
- The roads paved in percent of all roads (*Road*),
- The number of telephone line per 1000 people (*Tel*).
- The number of computer per 1000 people (*Comp*).

The existence, the cost, maintenance and the correct operation of infrastructure elements , such as roads, transport, electricity, telecommunications and harbour equipment, is of capital importance for profitability and there competitiveness of the firms. They is especially, these last years, on the infrastructure, education and other services in social matter that the public investment in a great number of countries of Africa sub-Saharan. In some, however, the budgetary constraints involved a strong reduction of the public investment in general, and in particular in field of the infrastructure. An insufficient infrastructure will discourage the investment and could even end up pushing the foreign investor to the relocalization. It is not only much of countries of Africa do not have a sufficient physical infrastructure; what they have suffers of a cruel need for reconditioning and modernization, so that the new investments will be necessary to develop its capacity and to improve economic effectiveness. Sub-Saharan Africa economies dispose of 19.69 percent from the gross roads paved against 63.12percent for NA and 78.32 percent for the ASE countries of our sample. Here , again, there are large differences among the countries of each region. Although a majority of countries have progressively improved their road infrastructure in ASS, the level was still low in Malawi, in Madagascar and in Zambia ; only in South Africa and Nigeria where construction equipment was rather equivalent to that in north Africa but lower than the Asian ones.

The same observation can be made for the computer and the telephone network, the level of these equipment, for the Sub-Saharan Africa, has remained deficient compared to

ASE and less to AN countries. Over the period 1989-2003, the mean rate of main telephone per 1000 people is 18 for ASS, 48 for NA and 215 for ASE.(See Annex 3).

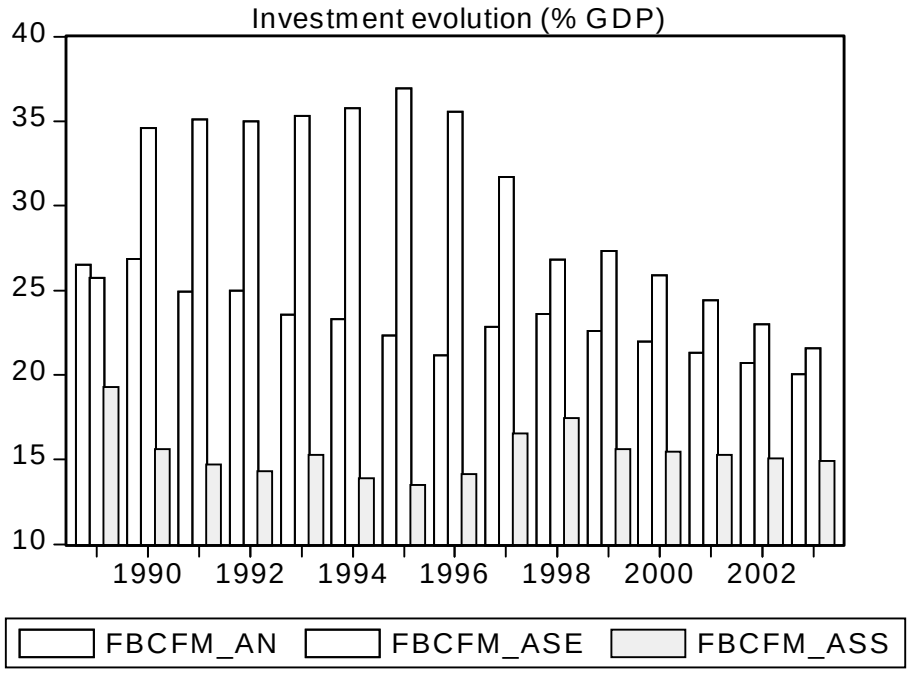
Figure VI



II.5/ The ratio of private investment to GDP (*Inv*) : With the acceleration of reforms and the economic liberalisation, private investment increased throw out the world in 1990s. The South African countries and North Africa followed this pattern but at a lower pace: The Gross fixed capital formation annual growth (GFCF) in ASS grew by 4.46 percent per year and represents, a mean of 15.47 percent of the GDP over the period 1989 to 2003 while in AN the GFCF growth is similar to thus of ASS (4.46 percent per year) but it represents 23.87 percent of the GDP of the region less than the mean of the investment rate in the East Asia region with 32.69 percent of the GDP .

The rates of the investment were very weak in the majority of the Sub Saharan countries of Africa. It is not less clearly than an acceptable level of economic growth and a significant retreat poverty will not be possible without a substantial increase in levels of the investment; it would be necessary that, of their current average of 16-18 percent, those reach the rates from 25 to 30 percent of Asia and the North Africa . It would be necessary to start by analysing the reasons which make that the rates of the investment were weaker in Africa than elsewhere, in carrying in particular attention on the key determinants of the investment, who are generally the same ones for all the investors, who they are national or foreigners. In general, the decisions of investment are the result of a process consisting in weighing the risks of an immediate engagement of capital compared with those which there can be to postpone a decision too "irreversible " in the hope to reduce the share of uncertainty. It seems that, in the case of much of African countries , the decisions of investment are made more difficult by the fact that various real or/and supposed risks come to be grafted on the general framework of these determinants .

Figure VII



III/ The econometric analysis

III.1/ The model tested

This section addresses the link between growth, investment and the economic reforms developed above. For this purpose we have to estimate a simultaneous equations system related to Growth and private investment for the three regions.

In this system, The long run GDP per capita growth rate , inspired by Barro and Sala-I-Martin (1995), depends on the logarithm of the initial level of the GDP per capita, on the ratio of investment to GDP and the composite economic reform indicators, as well as physical infrastructure, structural reforms, macroeconomic stability and human capital indicators.

The equation of investment considered here extends the neoclassical accelerator model and takes various constraints faced by investors into account. These constraints or variables aim at explaining the differences across countries in the long term level of GDP per capita . In our case , we have added the accelerator and the user cost of the capital.

$$Grow_{i,t}=a\ln(y_{i,t-1})+binv_{i,t}+\alpha MS_{i,t}+\beta SR_{i,t}+\lambda PI_{i,t}+\rho HC_{i,t}+\varepsilon_{i,t}$$

$$Inv_{i,t}=e\ln(Acc_{i,t})+\eta Int_{i,t}+\xi_{i,t}$$

where :

- $Ln(y_{i,t-1})$ is the logarithm of the initial level of the GDP per capita (called the catch up effect in the growth literature).
- *Inv* is the investment ratio to GDP.
- *MS* ,the Macroeconomic stability indicator is an important part of the countries growth. Macroeconomic stability provides a more reliable economic environment , it's based on inflation(*P*), the public deficit (*Defg*) and the ratio of external debt (*Deb*). The macroeconomic stability index is expected to be positive.

- *SR*, structural reform indicator: This variable constitute an important determinant of the actual and future growth and investment The structural reform index incorporates an indicator of trade policy (*Com*) and the ratio of private sector credit (*Cre*). (See appendix n°2 for PCA to determine the structural reform indicator). All these factors create a favourable conditions for the country and for enterprises to invest.
- *PI*, physical infrastructure indicator can be seen as a complementary factor of private investment . Physical infrastructure stimulates private capital formation by rising the profitability of the investment ; It incorporates the roads paved (*road*), the number of telephone line (*tel*) and the number of computer (*Comp*).The expected sign of the coefficient is positive.
- *HC*, Human capital is a composite indicator of the infant mortality (*Mor*) and the number of secondary schooling (*Sch*); Human capital indicator have a positive impact on growth.
- *Ln(Acc)* , as a proxy for the business cycle (the GAP), is measured by the difference of actual to potential GDP . The potential GDP is calculated using a *Hodrick-Prescott filter* on the level of GDP. This variable *Acc* is chosen to accommodate the neoclassical theory of flexible accelerator developed by Jorgenson (1963). This variable is expected to have a positive coefficient.
- *int* is the real interest rate as a proxy of the user cost of the capital , calculated as the difference between the money market rate and the consumer price inflation. A negative sign of the coefficient is expected.
- Ln(….) the logarithm of the variable.

Because of the endogeneity due to the interaction of the output gap and private investment, the system was estimated by instrumental variables. The instruments are: The real Money supply defined as M3 deflated by the GDP, the ratio of public expenditures to GDP and the terms of trade.

III.2/ Estimation results

The first step of our estimation analyses the degree of integration of the variables of the model developed in top . we therefore determined the order of integration of the series. Table in annex 4 provides the results of the ADF tests of the data for our sample of countries from 1989 to 2003. We have used the *Kwiatkowski-Phillips-Schmidt-Shin* (KPSS) methodology on Eviews 4.1, witch provides critical values of ADF tests in the case of heterogeneous panel data with less than 20 individual observations. The results in appendix 4 indicate that the series are generally stationary at the level for South East Asian countries and, at the level and at the 1^{st} difference for some AN and ASS series.

To control for the sample heterogeneity , we have introduced a dummy variables for South East Asian countries that reflect the 1997 and 1998 crises

The system above describes the long run relationship between growth and a number of macroeconomic variables. this system has been estimated on unbalanced panel of 18 countries from 1970-1989 to 2003. Following Hausman-test we retain a fixed effect panel. The pooled least square estimation fixed effect gives results in table II.

Table II: Estimation results (*dependant variable Grow*)			
Variables	Coefficient for AN	Coef._ASE	Coef_ASS
Inv	0.87 (18.95)	0.18 (1.88)	0.88 (4.65)
Y	0.09 (4.4)	0.02 (2.59)	0.02 (4.65)
MS	0.78 (9.07)_**(I)**	------	0.08 (4.57)_**(I)**
SR	----	0.173 (2.52)_(**II**)	----
PI	----	-----	0.59 (2.52)_**(I)**
HC	0.12 (5.89)_**(I)**	-----	-----
HC*SR	-----	0.01 (2.41)_**(II)(II)**	----
HC*PI	-----	0.01 (2.45)_**(II)(I)**	-----
MS*SR*PI	0.02 (9.34)_**(I)(II)(I)**	-----	-----
Dummy	-----	-0.09 (-3.23)	-----
Hausman-test	241.2	11.09	7.67
P-value	0.000	0.003	0.009
Adj.R-Squared	0.48	0.31	0.54
F-Stat in F.Effect	126	2.22	38.18

Estimation results (*dependant variable: Inv)*			
Variables	Coefficient for AN	Coef._ASE	Coef_ASS
Acc	0.02 (4.41)	0.07 (6.12)	0.11 (10.61)
Int	- 0.06 (-2.7)	-0.00 (-1.88)	-0.02 (-2.01)
Hausman-test	21.2	9.79	6.97
P-value	0.002	0.009	0.01

Note: Student t statistics are within brackets
(I): One lag, (II) : Two lags
----: Variables not take into account in this estimation

In this estimation, almost all explanatory variables exhibit a significant impact on investment and then on growth. The “best” estimations are reported in the table above . catch separately, The PI and HC -for north Africa countries- are not correlated with the other determinants of our model but together with MS they have the expected sign and are significant. The investment variable and the initial level of GDP have the expected sign , witch implies that anticipations of economic growth induce more investment

For ASE, the MS,PI and HC take separately are not significant; in addition the coefficient of the multiplicative term of HC and SR is significant and have the same magnitude as that of PI and HC, this results highlight the complementary between HC and MS and PI ; the estimation shows also that reforms are not instantaneous : they need some time (between one and two years according to our estimation) to materialize into growth. As expected, the reforms effects are faster for AN and ASS (one year) than that for ASE. For this region we had introduced a dummy variable to take into account the financial crises . This variable is equal to one for the years 1997 and 1998 and equal to zero elsewhere.

For the Sub Saharan Africa countries, The MS and the PI are significantly important as the private investment .

IV/ Contribution of economic reforms to the long run economic growth

The north Africa and the sub Saharan Africa countries have been characterized with low trade openness, slow growth, high external debt , commercial deficit… in the last two decades ; Real economic reforms would help these regions to catch up other more advanced regions, East Asia in particular.

In this section , we have to estimate the equation above, we suppose that NA and ASS applied the East Asian reforms: we have taken the ASE as reference and calculated the rate of economic growth that NA and ASS could have reached if the region had undertaken the same level of reform and had faced the same economic condition as the East Asian countries.

Following this analysis, we have quantified how much economic reforms have contributed to economic growth. The results are presented in the following table.

Table III: Contribution of reforms to economic growth (%)

	AN	ASS
MS	0.27	0.19
----Inflation	0.11	0.02
----Public deficit	0.19	0.27
----External debt	0.23	0.14
HC	0.19	0.86
----Mortality infantile	0.60	1.86
----secondary Schooling	0.61	1.23
PI	0.17	0.39
----Road paved	0.80	1.31
----Tel	0.12	0.45
----Computer	0.27	0.97
SR	0.21	0.23
----Trade	0.62	0.02
----Private credit	0.86	1.03
Economic Reforms	0.84	1.67

Source: our calculation

The contribution of MS to growth also appears to be substantial for the both regions (AN and ASS) . The importance of MS is illustrated, in our sample, by the experience of other regions. Our calculation shows that North Africa region would more increase their economic growth rate during the period 1989-03 by 0.11 percent , 0.19 percent and 0.23percent if they had the same Inflation, public deficit and external debt than South East Asian countries without changing the other economic growth determinants. This increase for the macroeconomic stability indicator would even have been higher than in Sub Saharan Africa countries (0.19 percent against 0.27percent) because the substantial public deficit and external debt control: A more stable internal and external deficit, like in Asia, would have stimulated Sub Saharan Africa economic growth by 0.27percent and 0.14 percent .

The importance of Human capital for the growth experience of the NA and ASS regions is illustrated in the table II above. In total, for NA , the economic growth would have increased by 0.19 percent instead of 0.86 percent for ASS , if these regions have the same human capital conditions as South East Asian countries. The results show also that the controlling mortality infantile and the amelioration of secondary schooling in ASS had an important impact on economic growth than thus exerted by NA economies. This means that, without progress in secondary schooling , economic growth would have been –0.61 percent

for NA and –1.23 percent for ASS. The HC contribution in economic growth is even higher in the case of ASS due to the initial gap in education and health for NA countries to other Sub Saharan Africa countries.

The contribution to growth of infrastructure and structural reforms also appears to be substantial. The PI contribution to economic growth is higher in ASS (0.39 percent) than in AN (0.17 percent) as the SR (0.23 percent and 0.21percent). In North Africa economies, however, the impact of physical infrastructure components remains inferior as compared to sub Saharan Africa countries. This low ratio is due to the fact that the north Africa region is better equipped than the Africa's one. Fixed effect are greater in NA than in ASS.

As a whole, the adoption of Asian economic reforms by the sets of the African countries would have to increase the growth of the non CFA Sub-Saharan Africa by 1.67 percent witch is the double of what the adoption of same reforms could have involved for North Africa countries (0.84 percent); this situation can be explained by the initial conditions of growth for every region and every country of our sample.

Conclusion

In this paper, it has been shown that economic reforms, in addition to economic environment, greatly affect growth. Our empirical analysis has clearly revealed the importance and the complementarities between macroeconomic reforms, physical infrastructure, human capital and structural reforms for the growth prospects of the economies. These factors have shown for three regions , a strong effect on growth and have contributed greatly to the growth process for north Africa countries and the non CFA sub Sahara African countries.

In north Africa economies and in the Sub Sahara African countries, the lack of macroeconomic reforms, the deficiencies of the physical infrastructure and the human capital explain, although at differing degrees , well the deficit in economic growth. This has been particularly the case of road networks, electronic equipments (telephone, computer), sanitary conditions (infant mortality) and schooling. An improvement of secondary schooling and physical infrastructure , similar to South East Asia, would have stimulated North Africa economic growth by respectively 0.61percent and 0.17 percent against only 1.23 percent and 0.39 percent for non CFA Sub Saharan Africa.

Our finding confirm that the lack of economic reforms remains a problem for a majority of North and Sub Saharan Africa economies, witch have failed to raise the rate of growth of their economy.

Bibliography

BARRO,R.J. (1991), Economic growth in a cross section of countries, Quarterly Journal of Economics, May , 106

BARRO, R.J. (1996), *Determinants of economic growth : A cross country empirical study*, NBER n° 5698.

BARRO,R.J. and X.SALA-I-MARTIN (1995), Economic Growth, McGraw-Hill, In NABLI, M.K. & VAROUDAKIS, M.A. (2004).

BARTH,J. G. CAPRIO, JR., AND R. LEVINE (1999), *Financial regulation and performance: Cross-country evidence* , World Bank Policy Research Working Paper 2037

BHATTACHARYA, AMAR, PETER J. MONTIEL & SUNIL SHARMA (1997) : *Private Capital Flows to Sub-Saharan Africa: An Overview of Trends & Determinants*, World Bank / FMI, Washington.

BURNSIDE ,C. & D. DOLLAR (1997), *Aid policies and growth*, The World Bank Policy Research Department.

UNCTAD : *World Investment Report* (Different numbers since 1997 to 2003): New York/ Genève.

COCKROFT, LAURENCE & ROGER C. RIDDEL (1991) : *Foreign Direct Investment in Sub-Saharan Africa*. Documents de travail, Politique générale, recherche et relations extérieures, Banque mondiale, Washington.

DAVID ,M.G. & ROY,J.R. (1993), what determines economic growth ? , Economic review, FED of Dallas , second Quarter.

DEININGER, K. & P. OLINTO (2000), *Asset distribution, inequality and growth*, World Bank Policy Research Working Paper 2375.

DOLLAR D. & A. KRAAY (2001), Trade , growth and poverty, World Bank Policy Research Working Paper 2615.

FISCHER, S. (1993), *The role of macroeconomic factors in growth*, NBER n° 4565

GHOSH,A. & S. PHILLIPS (1998), *Inflation, des-inflation and growth*, International Monetary Fund Working Paper WP/98/68.

GORDON,J. (1997), *The effect of increasing government employment on growth: some evidence from Africa*, International Monetary Fund Working Paper WP/97/33

HARRISON, A. (1991), *Openness and growth: A time series, cross country analysis for developing countries*, WP 809, World Bank.

ITO,T. (1997),What can developing countries learn from East Asia's economic growth, Annual World Bank Conference on Development Economics.

KWIATKOWSKI, DENIS, PETER C. B. PHILLIPS, PETER SCHMIDT & YONGCHEOL SHIN (1992). "Testing the Null Hypothesis of Stationary against the Alternative of a Unit Root," *Journal of Econometrics*, 54, 159-178.

LAHOUEL, M. (1999), the business environment in Tunisia, WBI

LAHOUEL,M.(1995), The experience of structural adjustment : Performance, Reforms and Prospects, ADB, Abidjan

LUCAS , R.E. (1988), *On the mechanism of economic development*, Journal of Monetary economics, N° 22.
MADDISON,A. (1991), Dynamic forces in capitalist development: A long run comparative view, oxford University Press , In DAVID ,M.G. & ROY,J.R. (1993).

MANKIW, N.G., ROMER,D.& WEIL , D.N. (1992), A contribution to the empirics of economic growth, Quarterly Journal of Economics, N° 2 , Vol. 107

NABLI, M.K. & VAROUDAKIS, M.A. (2004), *Reforms and growth in MENA countries: New empirical evidence*, WP series n°36 , The World Bank.

NELSON, R. & H. PACK (1997), *the Asian miracle and modern growth theory*, The World Bank .

OLSON, MANCUR (1996) : *Big Bills Left On The Sidewalk: Why Some Nations are Rich and Others Poor* : Journal of Economic Perspectives, Vol. 10, pp.3-24.

RODRIK D. (1998), *Trade policy and economic performance in sub-Saharan Africa*, National.

ROMER, P. (1990), endogenous technological change, Journal of Political Economy, 94

TALBI, B. & MORRISSON,C. (1999),La croissance de l'économie tunisienne en longue période, Centre de Développement de l'OCDE.

VAROUDAKIS, A. & PALOMA,A.C. (2004), *Growth , private investment , and the cost of doing business in Tunisia: A comparative perspective*, cahiers de l'IEQ, Tunisie

SFI : *Foreign Direct Investment* : Washington, 1997.

SFI : *Building the Private Sector in Afric*a, Washington, 1996.

Annex

Annex 0 : Growth rates of per capita real GDP, by Country (Annual average).

	1820-1870	1870-1989	1950-1973	1973-1989	1989-2003
Australia	1.9	1.2	2.4	1.7	3.47
Belgium	1.4	1.5	3.5	2.0	2.04
Denmark	0.9	1.8	3.1	1.6	1.90
Finland	0.8	2.3	4.3	2.7	2.00
France	0.8	1.8	4.0	1.8	1.92
Germany	0.7	2.0	4.9	2.1	1.38
Italy	0.4	2.0	5.0	2.6	1.55
Japon	0.1	2.7	8.0	3.1	1.95
Netherlands	0.9	1.5	3.4	1.4	3.03
Norway	0.7	2.2	3.2	3.6	3.07
Sweden	0.7	2.1	3.3	1.8	1.50
United kingdom	1.2	1.4	2.5	1.8	1.97
United States	1.5	1.9	2.2	1.6	3.01
Average	0.9	1.6	3.9	2.2	2.21

Source: Maddison (1991), our calculation for the (1989-2003) period

Annex 1: List of countries in the sample

North African countries	Non CFA Sub-Saharan African countries	South Eastern Asian countries
Algeria (DZA)	South Africa (ZAF)	Korea (KOR)
Egypt (EGY)	Nigeria (NGA)	Singapour (SNG)
Morocco (MAR)	Botswana (BWA)	Indonesia (IND)
Tunisia (TUN)	Madagascar (MDG)	Thailand (THA)
	Ghana (GHA)	Malysia (MYS)
	Zambia (ZMB)	Philippines (PHL)
	Kenya (KEN)	
	Malawi (MWI)	

Annexe 2 :The Principal Component Analysis

The weight attributed to each principal component corresponds to its relative contribution to the variance of the initial indicators calculated from the cumulative R^2.

THE MACROECONOMIC STABILITY (MS)

	Comp 1	Comp 2	Comp 3	
Eigenvalue	1.73	1.009	0.254	Sub-Saharan African countries
Variance Prop.	0.578	0.336	0.084	
Cumulative Prop.	0.578	0.915	1.000	
Eigenvectors:				
Variable	Vector 1	Vector 2	Vector 3	**MS = 0.57/0.91*V1+0.33/0.91*V2**
Defg_ ASS	-0.193	-0.956	-0.219	
P_ASS	0.678	-0.291	0.674	
Deb_ ASS	-0.709	-0.018	0.704	
	Comp 1	Comp 2	Comp 3	South East Asian countries
Eigenvalue	2.051	0.866	0.081	
Variance Prop.	0.683	0.288	0.027	
Cumulative Prop.	0.683	0.972	1.000	**MS= V1**

Variable	Vector 1	Vector 2	Vector 3	
Def g_ASE	0.676	0.140	0.722	
P _ASE	-0.359	0.919	0.157	
Deb _ASE	0.642	0.365	-0.673	
	Comp 1	Comp 2	Comp 3	North African countries
Eigenvalue	1.872	0.958	0.168	
Variance Prop.	0.624	0.319	0.056	
Cumulative Prop.	0.624	0.943	1.000	
Eigenvectors:				**MS= V1**
Variable	Vector 1	Vector 2	Vector 3	
Defg _AN	0.691	0.141	0.708	
P _AN	-0.689	-0.160	0.705	
Deb _AN	0.213	-0.976	-0.013	

THE HUMAN CAPITAL (HC)

	Comp 1	Comp 2	
Eigenvalue	1.723	0.276	North African countries
Variance Prop.	0.861	0.138	
Cumulative Prop.	0.861	1.000	**HC = V1**
Eigenvectors:			
Variable	Vector 1	Vector 2	
Sch_AN	-0.707	-0.707	
Mor_AN	0.707	-0.707	
	Comp 1	Comp 2	East Asian countries
Eigenvalue	1.886	0.113	
Variance Prop.	0.943	0.056	
Cumulative Prop.	0.943	1.000	**HC = V1**
Eigenvectors:			
Variable	Vector 1	Vector 2	
Sch_ASE	-0.707	-0.707	
Mor_ASE	0.707	-0.707	
	Comp 1	Comp 2	Sub-Southern African countries
Eigenvalue	1.258	0.741	
Variance Prop.	0.629	0.370	
Cumulative Prop.	0.629	1.000	**HC= V1**
Eigenvectors:			
Variable	Vector 1	Vector 2	
Sch_ASS	-0.707	-0.707	
Mor_ASS	0.707	-0.707	

STRUCTUREL REFORMS (SR)

	Comp 1	Comp 2	
Eigenvalue	1.226	0.773	North African countries
Variance Prop.	0.613	0.386	
Cumulative Prop.	0.613	1.000	**SR= V1**
Eigenvectors:			
Variable	Vector 1	Vector 2	
Crt_AN	-0.707	-0.707	
Com_AN	0.707	-0.707	
	Comp 1	Comp 2	East Asian countries
Variance Prop.	0.608	0.391	**SR = V1**

Variance Prop.	0.608	0.391	
Cumulative Prop.	0.608	1.000	
Eigenvectors:			
Variable	Vector 1	Vector 2	
Crt _ASE	-0.707	-0.707	
Com _ASE	0.707	-0.707	
	Comp 1	Comp 2	
Eigenvalue	1.319	0.680	
Variance Prop.	0.659	0.340	
Cumulative Prop.	0.659	1.000	Sub-Southern African countries **SR=V1**
Eigenvectors:			
Variable	Vector 1	Vector 2	
Crt _ASS	0.707	0.707	
Com _ASS	0.707	-0.707	

PHYSICAL INFRASTRUCTURE (PI)

	Comp 1	Comp 2	Comp 3	
Eigenvalue	2.588	0.395	0.015	
Variance Prop.	0.862	0.131	0.005	
Cumulative Prop.	0.862	0.994	1.000	North African countries
Eigenvectors:				
Variable	Vector 1	Vector 2	Vector 3	**PI= V1**
Road_AN	-0.527	0.839	0.127	
Tel_AN	0.591	0.471	-0.654	
Comp_AN	0.609	0.269	0.745	
	Comp 1	Comp 2	Comp 3	
Eigenvalue	2.576	0.415	0.007	
Variance Prop.	0.858	0.138	0.002	
Cumulative Prop.	0.858	0.997	1.000	East Asian countries
Eigenvectors:				
Variable	Vector 1	Vector 2	Vector 3	**PI = V1**
Road_ASE	0.520	0.852	0.045	
Tel_ASE	0.607	-0.332	-0.721	
Comp_ASE	0.600	-0.403	0.690	
	Comp 1	Comp 2	Comp 3	
Eigenvalue	1.946	0.910	0.142	
Variance Prop.	0.648	0.303	0.047	
Cumulative Prop.	0.648	0.952	1.000	Sub-Southern African's countries
Eigenvectors:				
Variable	Vector 1	Vector 2	Vector 3	**PI=V1**
Road_ASS	-0.431	-0.823	0.367	
Tel_ASS	0.688	-0.038	0.723	
Comp_ASS	0.582	-0.565	-0.583	

Annex 3

The mean of MS, HC, PI and SR indicators (percent) over the period 1989-2003 for the different region

		North Africa	Sub-Saharan African	South east Asian
MS composite	*P*	10.4	33.37	6.58
	Defg	63.27	83.70	37
	Deb	-3.97	-2.04	3.39
MS		-46.33	-22.28	26.04
SR composite	*Crt*	41.20	29.83	91.75
	Com	61.84	62.14	132.40
SR		14.45	22.61	28.45
PI composite	*Road*	63.12	19.69	78.32
	Tel	48.04	18.71	215.83
	Comp	5.41	8.80	85.74
PI		4.92	2.59	22.61
HC composite	*Mor*	47.18	95.59	20.75
	Sch	57.83	29.08	61.11
HC		6.27	-13.80	26.99

Annex 4

Augmented Dickey-Fuller (ADF) KPSS Tests : North Africa countries

Variables	LM-stat	Critical Values	KPSS test	Specification
Grow	0.405	0.216*	**d(Grow**)	Intercept+ Trend
Y	0.496	0.463**	y	Intercept
Inv	0.393	0.347***	Inv	Intercept
MS	0.154	0.146**	**d(MS)**	Intercept + trend
SR	0.168	0.146**	SR	Intercept + trend
PI	0.165	0.146**	PI	Intercept + trend
HC	0.132	0.119***	HC	Intercept + trend
Acc	0.405	0.216*	**d(Acc)**	Intercept + trend
Int	0.500	0.216*	Int	Intercept + trend

* significant at 1percent , ** significant at 5percent , *** significant at 10percent

Augmented Dickey-Fuller (ADF) KPSS Tests: South East Asian

Variables	LM-stat	Critical Values	KPSS test	Specification
Grow	0.352	0.347***	Grow	Intercept
Y	0.606	0.463**	y	Intercept
Inv	0.163	0.146**	Inv	Intercept + trend
MS	0.360	0.347***	MS	Intercept
SR	0.475	0.463**	SR	Intercept
PI	0.512	0.463**	PI	Intercept
HC	0.141	0.119***	HC	Intercept + trend
Acc	0.242	0.216*	Acc	Intercept + trend
Int	0.500	0.216*	Int	Intercept + trend

* significant at 1percent , ** significant at 5percent , *** significant at 10percent

Augmented Dickey-Fuller (ADF) KPSS Tests : Sub-Saharan Africa

Variables	LM-stat	Critical Values	KPSS test	Specification
Grow	0.138	0.119***	**d(Grow)**	Intercept+ Trend
Y	0.140	0.119***	y	Intercept + trend
Inv	0.192	0.146**	Inv	Intercept + trend
MS	0.247	0.216*	**d(MS)**	Intercept + trend
SR	0.127	0.119***	SR	Intercept + trend
PI	0.502	0.463**	PI	Intercept
HC	0.491	0.216*	HC	Intercept + trend
Acc	0.138	0.216*	**d(Acc)**	Intercept + Trend
Int	0.142	0.119***	**d(Int)**	Intercept + trend

* significant at 1percent , ** significant at 5percent , *** significant at 10percent