# I. SOURCES OF ECONOMIC GROWTH IN BENIN[1]

A. Background

1.   Benin has had a mixed record of economic growth since 1970: during 1970-79, growth averaged 2.9 percent a year (about the same average rate as other sub-Saharan countries), but was substantially volatile (with a standard deviation of 4.3). The period was characterized by the introduction of central economic planning under a Marxist and military regime. All banks and major industries were nationalized and new public enterprises were set up in most sectors of the economy. Economic growth during that period suffered from the oil crisis, but benefited from heavy public investment program and a strong demand in neighboring countries.[2]

2.   During the 1980s, economic growth averaged 2 percent. This low performance reflected faltering overall economic activity, operating difficulties of public enterprises, declining world commodity prices, and weak fiscal performance. The deterioration in economic growth, together with mismanagement and bad lending policies, culminated in the collapse of the banking system in 1988 and in the building of government arrears, including on wages and salaries for civil servants.

Figure 1. Benin: Real GDP Growth, 1970-2003
(In average annual changes in percent)

3.   In 1989, the country embarked on a new development strategy, changing the orientation of the economy away from the heavy government intervention and controls and emphasizing the central role of the private sector, the return to fiscal discipline, and the rehabilitation of the banking system. The fiscal adjustment and structural reforms implemented during 1989-93 laid the foundations for a sustained private-sector-led-growth; at the same time, a multiparty democracy was established.

4.   Since 1994, sound macroeconomic policies, together with the devaluation of the CFA franc in January 1994 and the implementation of structural reforms, helped Benin achieve a growth rate averaging about 5 percent a year during the period 1994-2003.

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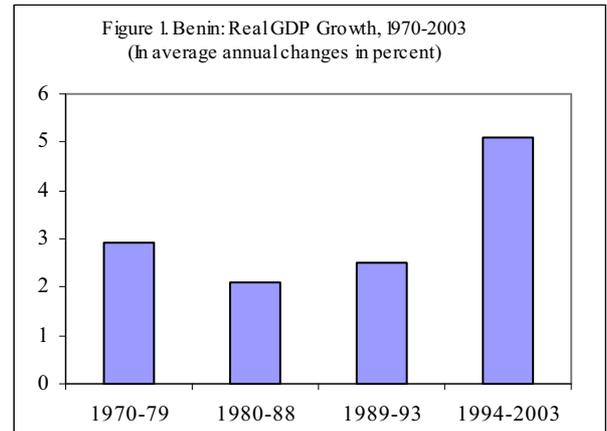
[1] Prepared by Fabien Nsengiyumva
[2] Large projects that were undertaken included the creation of a cement production plant, the planting and processing of sugarcane, the exploitation and refining of offshore oil, and the doubling of capacity at the port of Cotonou.

5.   The structure of Benin's economy has changed only slightly over the period 1970-2003. Available data (see Table I.1) indicate that, although the tertiary sector remains dominant, particularly due to the importance of Benin's trade with Nigeria, its share in nominal GDP has declined from 53 percent during the 1970s to 50 percent over the last ten years, while that of the primary sector has increased in parallel, from 34 percent to 36 percent. The growth of the primary subsector is partly explained by the strong increase in cotton production, which averaged 11 percent per year during 1990-2003. Over the period 1994-2003, growth has derived for 41 percent from the primary sector and for 45 percent from the tertiary sector. The share of the secondary sector has remained small. This sector consists largely of cotton ginning and small enterprises producing basic consumer goods for the local market.

B. Growth Accounting

Basic framework

6.   The growth accounting technique aims at allocating output growth between factor inputs and a residual, which measures the efficiency in the use of those inputs and changes in technology.[3] The growth accounting technique starts with an aggregate production function, which typically is specified as:

$$Y_t = A_t \, K_t^{\alpha} \, L_t^{\beta} \tag{1}$$

where Y is output, K represents physical capital, L is labor, A is the level of technology (also referred to as total factor productivity or simply TFP), t is a time subscript, and α and β are output elasticities with respect to capital and labor, respectively. By taking natural logs and differentiating, we obtain an exact decomposition of growth in real output (gy) into the growth rate of the TFP (gf) and the contribution of physical capital (α.gk) and labor (ß.gl):

$\ln Y_t - \ln Y_{(t-1)} = \ln A_t - \mathrm{Ln}\ A_{(t-1)} + \alpha\ [\ln K_t - \ln K_{(t-1)}] + ß\ [\ln L_t - \ln L_{(t-1)}]$
or,
$gy_t = gf_t + \alpha\ .gk_t + ß.\ gl_t \tag{2}$

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[3] The technique has received considerable attention for East Asian countries, for which it has been used to explain differences in growth rates across countries. The debate has centered on whether the East Asian miracle was driven primarily by factor accumulation (capital and labor) or total factor productivity (TFP) (see Collins and Bosworth (1996), Krugman (1994), and Sarrel (1997)). More recently, a number of papers have used the technique on sub-Saharan countries. The main results of these studies are summarized in Tahari A. and others (2004). These authors concluded, from their own estimates, that the average real GDP growth in the region during 1960-2002 was driven primarily by factor accumulation with little or no role for TFP, and that the recent increase in growth (during 1997-2002, relative to 1990-96) was accompanied by a pickup in TFP growth, particularly in countries whose programs with the Fund were on track.

with low-case characters representing variables in natural logarithms and a "g" in front of a variable standing for the change in the natural logarithm of the variable (and thus the growth rate of the variable). The decomposition in equation (2) indicates that if we have a good idea about the magnitude of the two output elasticities (α and ß) and the growth rate of the two inputs, we can then derive the growth rate of total factor productivity (gf) and the proportion of the growth of output that is generated by each of the three components on the right side of the equation (2).

7.   According to Bosworth and Collins (2003), growth accounting is subject to three weaknesses. First, the residual considered as total factor productivity can reflect a variety of determinants, in addition to technological innovation, that influence growth but that were not accounted for by the measured increases in factor inputs.[4] Second, the decomposition is sensitive to underlying assumptions about the nature of the production process and/or to measures of changes in output and the inputs. Finally, an accounting decomposition cannot determine the fundamental causes of growth. Despite these limitations, many authors still consider the growth accounting exercise as a useful tool to identify the sources of growth.

Estimating the two output elasticities

8.   In order to determine the output elasticity with respect to each of the two factors of production, we estimate the production function, using the Johansen multivariate cointegration procedure to the series of output, capital, and labor force over the period 1970-2003.[5] The series for the stock of capital was constructed using the perpetual inventory method and assuming a constant depreciation rate of 5 percent and a capital-output ratio of 1.5 in the initial year (1970), in line with assumptions taken by other studies on similar countries. Active population (age 15 and up) was used as a proxy for total labor force. The finding of cointegration would imply the existence of a stable, long-run relationship among the three series. To determine the order of integration of the data series, we use the augmented-Dickey-Fuller (ADF) test on the level of variables as well as on their first differences, both with a constant and/or a deterministic trend. The output and labor force series were found to be nonstationary. Once expressed in first differences, they were found to be stationary, which is an indication that they are both integrated of order 1. In contrast, the series for physical capital was found to be of order 2. Given that the Johansen methodology allows different levels of integration, we assumed all the three series to be cointegrated, and this conjecture was later confirmed through the multivariate cointegration analysis.

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[4] These could include political disturbances, external shocks, institutional changes, and errors in measuring factors of production.

[5] Data on investment in real terms were obtained from the World Economic Outlook (WEO) database for the period 1981-2000. Those for the period 1970-80 were estimated from the WEO data in nominal terms (in the absence of a series in real terms for the period), using the GDP deflator. Data for population of age 15 and up were obtained from World Development Indicators (World Bank). Due to lack of information on education attainment, no adjustment for labor quality was introduced.

9.   The estimation derived the following long-run relationship between output, capital, and labor:

$$y \ = \ 0.50\,k \ + \ 0.47\,l \tag{3}$$

The hypothesis of constant returns to scale (the sum of the two elasticities equal to one) was also tested and could not be rejected. No serious misspecification was detected. However, the estimated speed of adjustment to the long-run equilibrium relationship was found to be negative but very low (7 percent), suggesting a slow adjustment mechanism to any temporary disequilibrium. The estimated output elasticity with respect to physical capital (0.5) is higher than in most studies on low-income countries, which generally ranges from 0.3 to 0.4. This may be due to particular features of the Beninese economy, but also to the low quality of the data used in our estimation.

Sources of growth

10.   Using the value of the two elasticities derived from the estimated long run production function, we conducted a growth accounting exercise over four distinct subperiods: (i) 1970-79, the initial period of centrally planned economy; (ii) 1980-88, a period of mounting crisis of the centrally-planned economic regime; (iii) 1989-93, a period of economic liberalization accompanied by far-reaching structural reforms; and (iv) 1994-2003, which was characterized by higher economic growth, fiscal consolidation, and the continuation of structural reforms.

11.   The results obtained show that, during the 1970s, physical capital accounted for more than half of the overall output growth of 2.9 percent in average (see Table II.2). The contribution of total factor productivity was negative (-0.7) but was characterized by considerable volatility around this average (with a standard deviation of 4.5), reflecting the large variations in the level of real GDP growth. The results also indicate that the slowdown in economic growth experienced in the 1980s was accompanied by a negative contribution of total factor productivity (-0.8). In contrast, the substantial increase in real GDP growth during 1994-2003 was the result of (i) a larger contribution from capital accumulation, reflecting increased private and public investment; and (ii) a positive contribution of total factor productivity, generated by gains in increased efficiency of the factors of production. The turnaround in TFP performance in the recent period could reflect, in large part, progress achieved in implementing structural reforms and could be considered as the growth payoff to the policy changes initiated since the early 1990s. These policies emphasized the reduction of the role and size of the public sector, the elimination of price distortions, the return to fiscal discipline, and the central role of the private sector in economic activity.

12.   The sensitivity of these results to the value of the capital-output elasticity was evaluated, using a value of 0.35 for α (instead of the estimated value of 0.5), corresponding to the mid-value of the range of elasticities generally used in many other studies for low-

income countries and assuming constant returns to scale.[6] Table I.3 indicates that, qualitatively, the growth accounting exercise reaches the same conclusions. However, we could have underestimated the contribution of total factor productivity in recent years, had the output elasticity been lower than the estimated value (0.5).

C. Conclusion

13.   Two conclusions may be drawn in light of the above presentation. First, poor economic policies (through their effect on total factor productivity and capital accumulation) hurt Benin's economic growth during the 1970s and the 1980s. Policies implemented since the early 1990s paved the way for higher growth rate by raising total factor productivity as well as capital accumulation. Second, to reach their objective of a higher and sustained growth rate and reduce poverty, the authorities should (i) accelerate the implementation of structural reforms, as they would be key to raising the efficiency of the economy and the accumulation of factors of production; (ii) encourage private investment, in particular through improved governance and transparency, as it would increase the stock of capital and generate technological spillover effects that could help improve total factor productivity; and (iii) boost the quality of labor through implementation of human capital development programs and increased social expenditures.

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[6] This value for the elasticity of output to capital has been widely used in other studies on developing countries (see for example B. Bosworth and B. M. Collins (2003)).

Table I.1. Decomposition of Benin Growth by Sector During 1970-2003 1/

	1970-80 2/	1981-85 2/	1986-1993	1994-2003
1. Sectoral shares in nominal GDP (in percent)				
Primary sector	33.7	33.1	35.1	36.2
Of which				
Agriculture	---	---	25.7	28.2
Secondary sector	13.8	14.0	13.1	14.2
Tertiary sector	52.5	52.0	51.8	49.6
Commerce	---	---	16.6	18.3
Transport and other services	---	---	8.0	7.7
Public administration	---	---	10.3	6.7
Other services	---	---	16.9	17.0
2. Average real growth per annum				
Primary sector	2.3	5.0	4.5	5.8
Of which				
Agriculture	---	---	5.3	6.6
Secondary sector	2.1	1.2	1.5	5.1
Tertiary sector	3.5	1.5	1.3	4.6
Commerce	---	---	1.6	4.4
Transport and other services	---	---	-1.7	5.1
Public administration	---	---	-0.7	3.5
Other services	---	---	2.6	5.2
GDP at market prices	2.9	2.6	2.5	5.1
3. Sectoral contribution to real GDP growth (in percentage points)				
Primary sector	0.8	1.7	1.6	2.1
Of which				
Agriculture	---	---	1.5	2.2
Secondary sector	0.3	0.2	0.2	0.7
Tertiary sector	1.8	0.8	0.7	2.3
Commerce	---	---	0.3	0.8
Transport and other services	---	---	-0.1	0.4
Public administration	---	---	-0.1	0.2
Other services	---	---	0.4	0.9
GDP at market prices	2.9	2.6	2.5	5.1

1/ EDSS data for the period 1971-85 and desk data for the period 1986-2003
2/ Data on subsectoral value-added are not available for the period 1970-85.

Table I.2. Benin: Sources of Economic Growth During 1970-2003 With α = 0.5								
	1970-79		1980-88		1989-93		1994-2003	
	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.
Real GDP growth	2.9	4.3	2.1	3.3	2.5	3.0	5.1	0.6
Contribution of physical capital 1/	2.3	0.8	1.7	1.5	0.9	0.3	2.3	0.4
Contribution of labor force 1/	1.3	0.4	1.3	0.1	1.5	0.1	1.7	0.0
Contribution of total factor productivity 1/	-0.7	4.5	-0.8	3.7	0.0	2.7	1.0	0.6

1/ Percentage points.

Table I.3. Benin: Sources of Economic Growth During 1970-2003 With α = 0.35								
	1970-79		1980-88		1989-93		1994-2003	
	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.	Mean	St. dev.
Real GDP growth	2.9	4.3	2.1	3.3	2.5	3.0	5.1	0.6
Contribution of physical capital 1/	1.6	0.6	1.1	1.1	0.7	0.2	1.6	0.3
Contribution of labor force 1/	1.7	0.5	1.7	0.2	2.0	0.2	2.2	0.1
Contribution of total factor productivity 1/	-0.4	4.5	-0.7	3.5	-0.2	2.8	1.2	0.5

1/ In percentage points.