Growth Working Paper No. 6

COTTON, WAR AND GROWTH IN CHAD (1960–2000)

by

Jean-Paul Azam
ARQADE, IDEI, University of Toulouse, Institut Universitaire de France,
and Centre for the Study of African Economies (CSAE), Oxford

and

Nadjiounom Djimtoingar
Ministry of Economic Promotion and University of N'Djamena (Chad)

Revised version: 11 July 2002

Acknowledgements : This paper was partly written while Jean-Paul Azam was visiting N'Djamena, during 20-30 January 2001. We wish to thank Etienne Moïta, deputy general secretary of the presidency, for an illuminating discussion spanning the whole post-independence period, as well as Georges Diguimbaye, for his long and rich memory. Written comments by Steve O'Connell were very helpful, and are also gratefully acknowledged, without implicating.

Prepared as a component of the AERC Collaborative Research Project,
Explaining Africa's Growth Performance

For

African Economic Research Consortium
PO Box 62882-00200 Nairobi, Kenya

January 2004

Contents

1. INTRODUCTION

Chad is a typical small Sahelian economy, of 7.7 million inhabitants in 1999, which is landlocked, partly a desert, and whose political life is dominated by the perennial rivalry between the northern semi-nomadic Muslims and the southern Animist and Christian farmers. The northerners speak an Arabic dialect, and in their majority rejected western education during the colonial days and after, while the southerners seized what they saw as a unique opportunity to develop, and speak Sara and French. The northerners live by raising cattle and other livestock, as well as trading and smuggling with neighbouring Algeria, Libya, Sudan and Egypt, in the north, and Cameroon, the Central African Republic, Niger and Nigeria in the south. The southerners produce the main export crop, cotton, and own most of the productive human capital. Their land contains huge oil reserves, which have been known since the mid 1970s and are going to be exploited at long last starting in 2003.

Until then, the growth experience of this country is dominated by the cotton sector, often disturbed by civil war, complicated by Libyan intervention. This is brought out strikingly by Section 2, which shows econometrically that after controlling for the different shocks due to political violence, growth in Chad is simply reflecting the evolution of growth in other cotton-driven Sahelian economies. These economies are quite similar to one another, all belonging to the CFA Zone, and dominated by the cotton sector, which is in turn dominated over most of the period by a French company, the CFDT. In the case of Chad, this can also be checked econometrically by a direct analysis of the impact of the output of the cotton sector on the whole economy, which is performed in this section as well. Cotton also provides the transmission channel whereby the 1994 devaluation of the CFA franc, an event that owes nothing to Chadian history itself, affected its growth path. It triggered a cotton-led export boom that pulled the economy upwards for a while.

The political shocks provide the idiosyncratic features of the Chadian growth history. The most important one occurred in 1979–1984, comprising three years of outright civil war followed by two years of near-genocidal massacres perpetrated in the cotton-growing area. This is a watershed in Chadian history, on all accounts. Section 3 shows that the pattern of growth is different before and after this period. There clearly was a gradual build-up leading to the outbreak of the civil war, when GDP per capita was going down on average. The post-conflict period shows a different profile, with a mere stagnation or slight recovery, at a significantly lower income level than before.

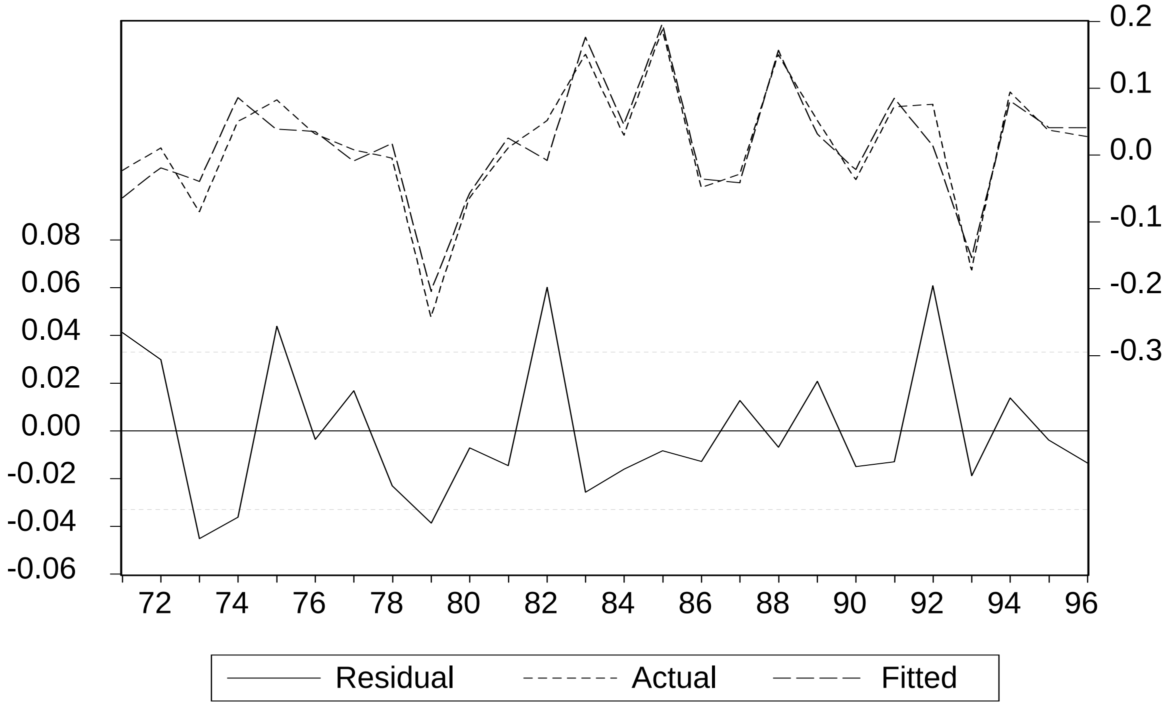
As cotton and war have thus been shown to be the crucial determinants of the Chadian growth history, in sections 2 and 3, the subsequent two sections describe in greater detail the history of the cotton sector (Section 4), and the political history that led, through the civil war, to a change in power from the (relatively) rich and educated southerners, who were running the country just after independence, to the poorer northerners, after the turmoil period of the war (Section 5).

2. COTTON-LED SAHELIAN GROWTH IN CHAD

A large part of the growth experience of Chad is simply shared with other Sahelian economies. This comes out clearly from Figure 1.

Figure 1 shows that a remarkable tracking of the growth rate of this economy over 1970–1996 can be achieved by using a very simple econometric equation, presented in column 1 of Table 1. Figure 1, and column 1 of Table 1 from which it is derived, show clearly that the growth rate of GDP in Chad, measured at constant 1987 local prices, can be tracked rather closely by taking into account only the growth experience of Burkina Faso and the various episodes of political violence. The series come from World Bank (1998). Although some fighting or massacre has been going on in this country since 1965, and almost until the present, we have identified 1979–1984 as the most acute period of the civil war, to construct the dummy variable “War” used in Table 1. In fact, the years 1983–1984 witnessed more a series of massacres perpetrated in the south of the country than a civil war proper.

Figure 1: Actual and fitted GDP growth rate (constant local 1987 currency)



Similarly, Libya occupied a piece of the Chadian country, the Aouzou stripe just across the border, beginning is 1973, but it was only in 1986 that the Libyan army launched a massive attack in the centre of the country. This triggered the victorious counterattack of 1987, which freed Chad from all Libyan presence. Hence, the “Warlib” dummy indicates the years 1986–1987. Some killings of southerners have taken place ever since the outbreak of the civil war in 1979. But they took another, much larger, dimension in 1982–1984, after the victory of the northerners in the civil war, under Hissein Habré, and again in 1993, under Idriss Déby. During that year of political trouble, the National Conference took place for venting the popular resentment (see Buijtenhuijs, 1998). The two episodes of massacres are captured by the “RepSouth” dummy variable. Beside these political variables, the estimated equation has a simple implicit error-correction specification à la Banerjee et al. (1993), with the GDP of Burkina Faso being included as the current growth rate and the lagged level, while the lagged value of the Chadian GDP is also included.

Table 1: GDP growth rate of Chad at local 1987 constant prices (dependent variable is GyChad)

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	1.44 (6.47)	1.04 (2.88)	1.70 (6.27)	1.03 (1.65)	1.38 (6.12)	1.44 (5.74)
War	-0.26 (11.15)	- 0.29 (6.62)	- 0.22 (7.38)	- 0.26 (9.72)	-0.25 (11.68)	-0.26 (10.84)
WarLib	- 0.13 (4.98)	- 0.09 (2.21)	- 0.14 (5.38)	- 0.12 (4.74)	- 0.13 (5.61)	- 0.13 (4.70)
RepSouth	- 0.09 (4.40)	- 0.07 (2.2)	- 0.11 (4.70)	- 0.10 (4.29)	- 0.10 (4.98)	- 0.09 (4.17)
LyChad(-1)	-0.73 (10.85)	- 0.83 (6.26)	- 0.68 (8.41)	-0.72 (10.29)	-0.74 (12.10)	-0.73 (10.56)
GyBur	1.01 (3.81)		0.84 (4.41)	0.90 (4.17)	0.79 (4.39)	0.85 (4.22)
Lybur(-1)	0.85 (4.34)		0.60 (4.62)	0.40 (8.22)	0.45 (7.40)	0.42 (9.26)
GyMali		0.49 (1.90)	0.00 (0.00)			
LyMali(-1)		0.56 (5.51)	- 0.27 (1.43)			
GyNiger				- 0.01 (0.09)		
LyNiger(-1)				0.07 (0.69)		
GySudan					0.22 (2.40)	
LySudan(-1)					- 0.04 (0.53)	
Devaluation						0.00 (0.07)

Nb. of obs.	26	26	26	26	24	26
R^2	0.90	0.73	0.92	0.91	0.94	0.90
DW	2.28	1.92	2.30	2.30	2.29	2.29
LM2	1.85	2.73	1.12	1.50	1.49	1.86
Rho	- 0.22 (0.86)	- 0.04 (0.12)	- 0.21 (0.80)	- 0.17 (0.58)	- 0.28 (0.99)	- 0.23 (0.90)

Note: t-ratios in parentheses beside the coefficients. Gy-Country Name is the growth rate of GDP at constant 1987 local prices, and Ly-Country Name is GDP at constant 1987 local price. War is a dummy equal to 1 in 1979–1984, to capture the civil war, while WarLib takes the value 1 in 1986/87, to capture the Libyan attempted invasion and eventual defeat, the Libyan army being thrown out of Chad in 1987. RepSouth is a dummy variable that indicates the dates when bloody repression by the army was inflicted on the south (1982–1984, 1993). *N* is the number of active observations, R^2 is the standard goodness-of-fit measure, DW the Durbin-Watson test, which is biased here, LM2 the Lagrange multiplier auto-correlation test up to the order 2, and Rho the coefficient of residual auto-regression estimated by the Cochrane–Orcutt method.

This equation suggests that GDP in Chad and Burkina Faso are cointegrated. This is confirmed by a direct application of the Johansen cointegration test, including War, WarLib and RepSouth as exogenous forcing variables. The likelihood ratio found for this test is 1.54, to be compared with a 5% critical value of 3.76. The cointegration equation reads: LyChad = 1.74 + 0.59 LyBur. Notice the small slope of this equation, which indicates that for each 1% of additional growth in Burkina Faso, Chad gets 0.59% additional growth, on average over the period of analysis. This estimate is probably biased, however, as it is much smaller than the corresponding slope that can be retrieved from Equation 1, namely 0.86, which does not suffer from omitted variable bias, unlike the direct estimate. Moreover, the error-correction representation, which is implicit in the equations of Table 1, à la Banerjee et al. (1993), entails a complicated auto-regressive/distributed-lag process, which allows for long drawn out effects of the shocks affecting the right-hand side variables on the growth of the Chadian GDP.

Column 2 shows that a nearly similar econometric performance can be achieved by using Mali instead of Burkina Faso, but with a less impressive fit. Moreover, in the encompassing equation of column 3, the Malian variables become insignificant. The next two columns show that neither Niger nor Sudan, the closest Sahelian neighbours of Chad, provide significant additional variables either, although the growth rate of Sudanese GDP is significant, but not its level, suggesting that the two series are not cointegrated. This suggests that what is at stake here is a “similarity effect”, rather than a “contagion effect” à la Easterly and Levine (1998). Both Burkina Faso and Mali are strongly reliant on cotton as their almost exclusive export crop. The closer fit obtained with Burkina is due to the political troubles affecting Mali, mainly around 1980, and again in the early 1990s, which are omitted from this equation. This also suggests that what is at stake here is not simply a CFA zone effect, as neither Mali not Niger can be used to substitute for the Burkina Faso effect. Similarly, the uranium boom in Niger does not seem to have had a significant spillover on the Chadian economy, nor does the Sudanese oil or civil war.

This interpretation of the results can be tested directly by looking at the impact of the output of cotton on GDP. More precisely, Table 2 presents two regressions that explain the growth rate of the Chadian GDP over the period 1963–1995 as a function of the level of cotton production. The dependent variable is the growth rate of GDP at constant local prices, from Azam et al. (1999). Equation 7 includes first as regressors the three variables representing political violence: War, WarLib and RepSouth, defined above. It turns out that War is the only one to remain significant, while the other two drop out. Equation 8, in the second column of this table, shows the result obtained by the parsimonious equation resulting from the deletion of these two variables. This implies that the impact of these two shocks is entirely captured by the level of cotton production, with no additional impact. This is not true of the War variable, suggesting that some additional effects, beside the fall in cotton production, are significant.

Table 2: The impact of cotton on GDP growth

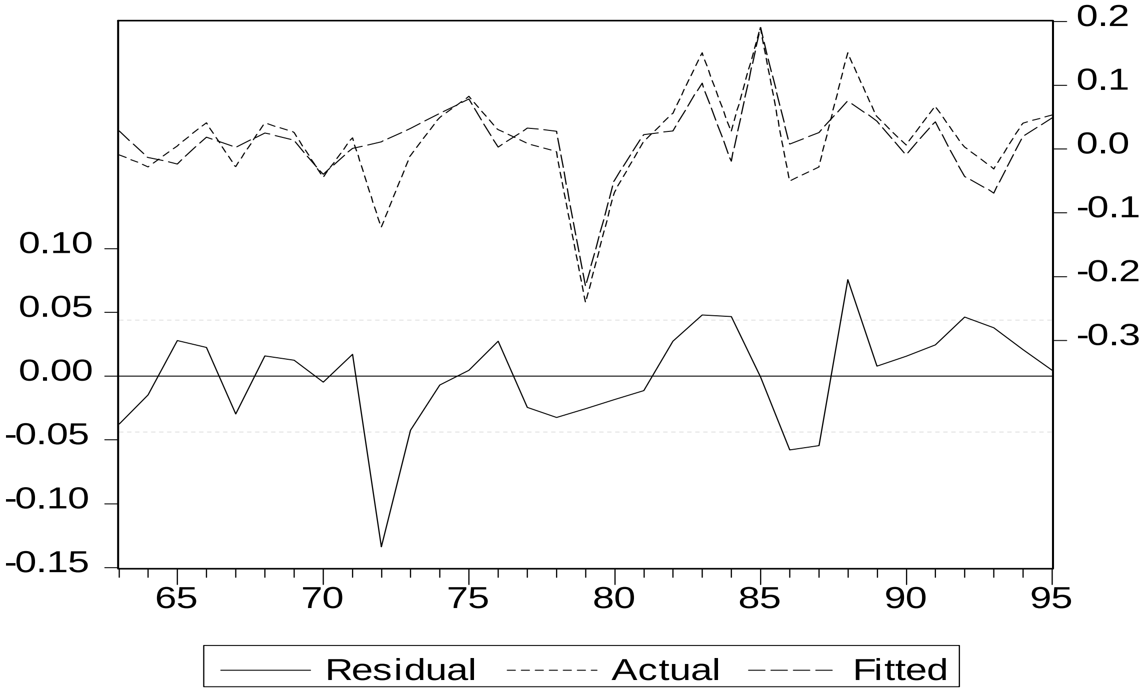
	(7)	(8)

War	- 0.22 (5.81)	- 0.21 (5.66)
WarLib	- 0.02 (0.66)	-
RepSouth	0.04 (1.34)	-
Gprod	0.11 (3.00)	0.11 (2.90)
Lprod(-1)	0.20 (3.85)	0.20 (3.66)
Lgdp(-1)	- 0.88 (5.83)	- 0.88 (6.02)
Lpop(-1)	0.38 (3.70)	0.39 (3.87)
Ltot(-1)	- 0.15 (2.19)	- 0.14 (2.06)
AR(1)	0.72 (4.81)	0.73 (5.00)
R^2	0.76	0.74
F-LM2	0.64 (p=0.53)	1.53 (p=0.24)

The other regressors are the growth rate and the log of cotton production, the latter being lagged once, and then the logs of GDP, population and the terms of trade, also lagged once. Therefore, this equation must be interpreted as comprising implicitly an error-correction mechanism à la Banerjee et al. (1993). This implies that there exists a cointegration equation linking the latter four variables. The sign of the long-run impact of the terms of trade on GDP, given the level of cotton output is a bit unexpected. Equations 7 and 8 imply that cotton output and population affect GDP positively in the long run, while the terms of trade affect it negatively. However, care must be taken to avoid interpreting this effect as the total effect of the latter on GDP, as what is captured here is the marginal effect, given the level of cotton output. As this sector is heavily taxed, as described in Section 3, the most probable mechanism for explaining this effect works as follows. A terms of trade improvement is to a large extent taxed away from the producers, and the proceeds are used to expand employment in the civil service and the public sector. This draws away some labour from the other productive sectors, with a negative impact on output. Lastly, an auto-regressive residual term is included, estimated by the Cochrane–Orcutt method.

Figure 2 represents the tracking of GDP growth that is achieved by Equation 8. The fit is pretty good for most of the period, with the exception of 1972. In Chad, the drought of the early 1970s was at least as damaging as it was in the rest of the Sahelian region. However, it is generally admitted that 1970 and 1971 were the worst years, and not 1972, which shows an unexplained fall in Figure 2. The most probable explanation is that our three political violence variables fail to capture the effects of the lower intensity fighting that was going on in some other years. For example, in 1971 and 1972, some severe fighting took place between the two main factions of the northern rebellion, while the 1969–1971 "pacification" campaign performed by the Chadian army with some French support reached a climax in 1971.

Figure 2: Tracking of GDP growth by Equation 8



An additional factor may be that the cotton sector was subjected in the course of 1971 to a major institutional change. The parastatal in charge of the sector changed status, becoming Cotontchad, owned by the Chadian government for 75% of its capital, while the French involvement fell to 19%. This change is described in more detail in Section 3 below. Such an institutional change might have entailed some temporary disorganization, which reduced the positive externalities produced by this sector to the benefit of the rest of the economy.

While the shadow of conflict gradually faded away, strengthening property rights and incentives to some extent, Chad saw its currency devalued in January 1994, together with all the other CFA Zone member countries. This occurred at the end of 1993, which saw both a lot of killing in the south by the government army, and the national conference, which started a sort of democratic dialogue. In addition, an enhanced structural adjustment facility (ESAF) agreement was signed with the International Monetary Fund (IMF) on 1 September 1995, as well as a SAP with the World Bank, signed in June 1997. The devaluation did not attract as much attention from the ordinary citizen as it did in many other CFA countries. Nevertheless, the supply response was spectacular in the cotton sector, and triggered an export boom. This response was distributed over several years, peaking in 1997/98. The same pattern can be found in the GDP series, as could be expected from the econometric exercises presented above. Table 3 shows how the growth of GDP and the rate of inflation evolved in Chad in the wake of the 1994 devaluation, together with the corresponding averages for the CEMAC economic and monetary community, to which it belongs. This table clearly shows that Chad is a slow grower, by CEMAC standards , with a more volatile rate of inflation. The export boom ended in 1999, however, owing to excessive rains in the south, as well as to an expansion of the food crops, as the price of cereals increased. Not surprisingly, GDP followed suit, starting a recession.

Table 3: Growth and inflation in the wake of the 1994 devaluation

	Real GDP growth rate (%)	**Inflation rate (%)**

	Chad	CEMAC	Chad	CEMAC
1994	4.0		49.2	41.7
1995	0.9	4.2	8.3	5.5
1996	2.9	5.0	10.5	2.8
1997	4.4	5.2	0.6	5.4
1998	6.5	4.9	3.0	3.3
1999	0.5	0.1	- 4.7	- 0..2
2000	- 0.3	3.5	13.0	2.1

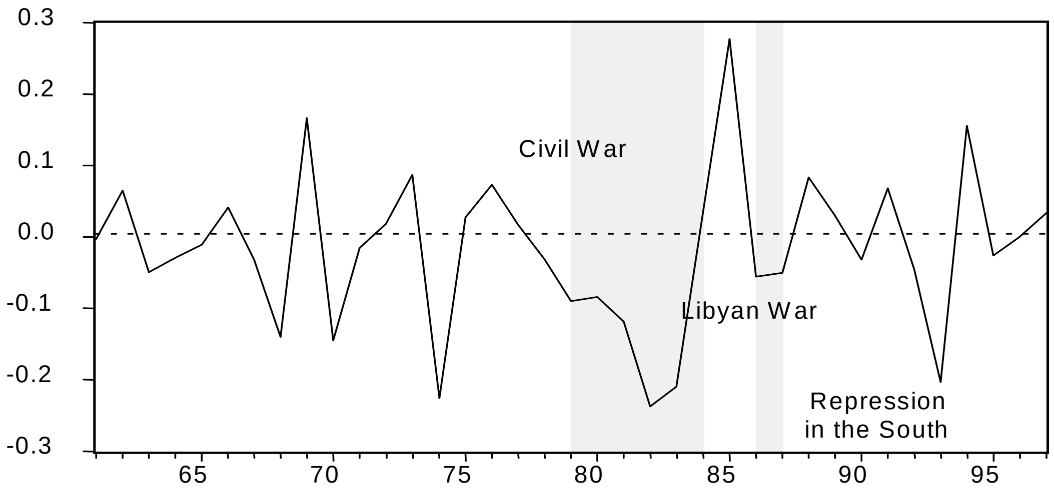
Source: Banque de France: *Rapport Zone Franc*, various issues.

In summary, the econometric exercises performed above single out clearly the two main points around which a historical account of the Chadian growth experience must be built: the development of the cotton sector, and the political economy of war and political violence. The following section gives a first account of this impact, by showing that the civil war separates clearly the periods that run before and after its occurrence. Section 4 then presents a history of the cotton sector, while Section 5 looks at the political history of this country, showing how the south failed to keep control of the country, which it had inherited from the French at independence, before the civil war gave it to the northerners.

3. THE THREE MAIN PHASES OF THE CHADIAN GROWTH HISTORY

A slightly different picture of the growth experience of Chad comes out of an examination of the time profile of per capita GDP measured at international or local prices, mainly after 1979. Then, over the whole period, episodes with positive growth are pretty rare and far apart, as seen from Figure 3. Strongly negative growth rates occur in some years, like 1968, 1970, 1974, the year of the oil shock, then 1979–1983, during the civil war, and again in 1993, when massacres were perpetrated in the south. Figure 4 shows the resulting time profile of per capita GDP at international prices.

Figure 3: Growth rate of per capita GDP at constant international prices



Over this period of time, one clearly identifies three subperiods with different characteristics: from independence in 1960 until the outbreak of the civil war in 1979, we observe a slow reduction in per capita GDP, with wide swings in the short run. The first oil shock, in 1974, seems to have had a significant negative impact. This was also a period of drought, which decimated the herds in the north. When the war breaks out, per capita GDP is 27.5% lower than in 1960.

Then, we have the civil war years, which witness the collapse of the economy. In 1983 per capita GDP reaches 50% of its 1962 value. This is followed from 1985 onwards by a period of stagnation of per capita GDP, slightly above 55% of its 1962 value, with some years of positive growth, disturbed by the Libyan war and by the 1993 bloodbath in the south, the cotton production area. The 1994 devaluation of the CFAF gives an additional impetus to growth, especially because of its fiscal effects, and the renewed aid effort that it triggered, which together allowed the government to pay the salaries of the civil servants, to invest and to clear some arrears.It might be useful to split the post-civil war period 1985–1997 into pre- and post-devaluation periods, but the sketch presented above is sufficient to illustrate the positive growth response that occurred.

Figure 4: Per capita GDP at international prices (log scale)

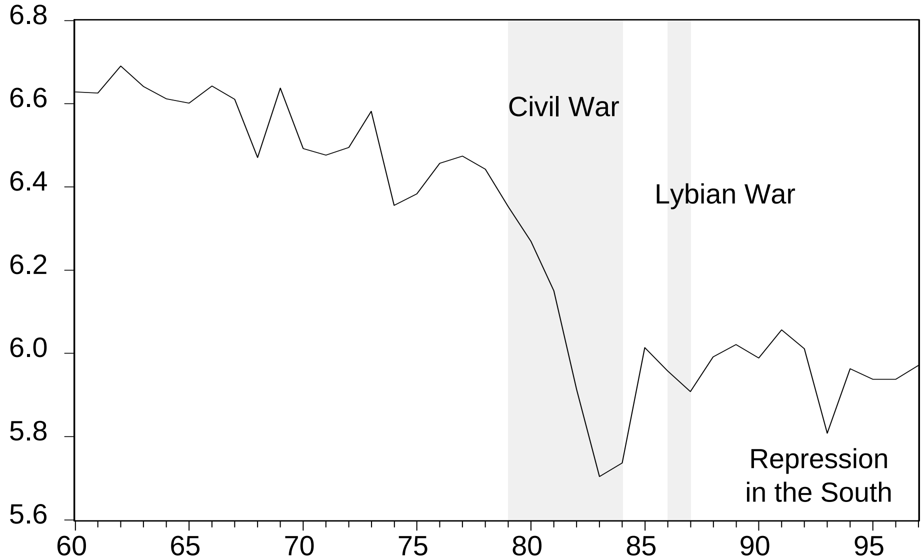
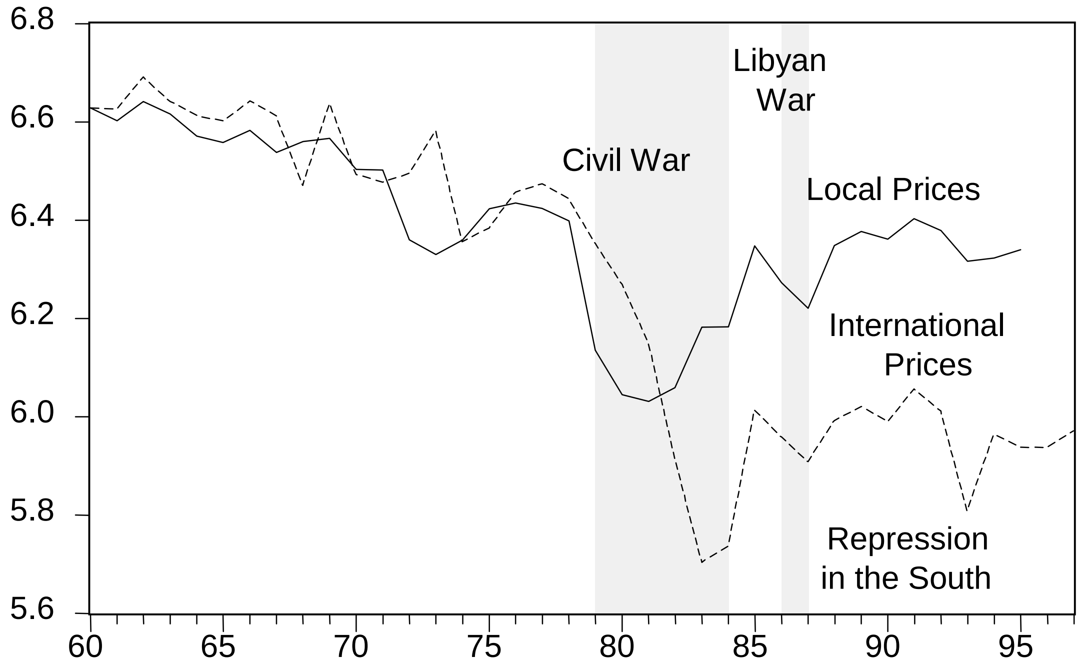


Figure 5 allows comparing the per capita GDP series at international and local prices, from Azam et al. (1999), expressed in log terms. The two series have been normalized to have the same base year, 1960. This type of comparison is a bit awkward, as the two series obey a different logic: while the local price data are based on value added, the international price series is based on the expenditure side (consumption, investment, etc.).The latter is nevertheless supposed to be an accurate indirect measure of GDP, the two being related by an accounting identity. Two main differences emerge immediately from this chart: the impact of the civil war seems both delayed and deeper in the international prices series, while the latter also indicates a much deeper fall in per capita GDP after the end of the civil war.

This type of divergence between the local price GDP series and the international price ones can be explained by the differences in the structure of relative prices between the two series. In particular, in economies where there exists a significant non-traded goods sector, the real exchange rate might play an important part. As shown by Azam (1991) and Azam and Wane (2001), however, this is not the case in the small open economies of the CFA Zone. In particular, the latter show that the 1994 devaluation of the CFAF had a negligible impact on the structure of relative consumer prices in several CFA Zone member countries. This suggests that most of these countries are price takers on the world market for most of their consumption goods, and thus that non-traded goods can be neglected as a first order approximation. Similarly, this devaluation has no impact on the series presented in Figure 5, suggesting that the real exchange rate cannot be the cause of their divergence.

Figure 5: Comparison of per capita GDP at local and international prices

(log scale)



A more important factor in Africa over most of this period is the implicit protection granted to the capital-intensive import substitution sector, mainly by the taxation of export crops, as well as by other means. In Chad, the taxation of cotton and livestock, described below, played this part. The impact of this type of distortion on economic growth was at the centre of the so-called immiserizing growth theory.

There are different types of immiserizing growth models, based on different mechanisms. The most relevant ones for the problem at hand analyse the impact of taxation or tariffs, and have been produced by Johnson (1967) and Brecher and Diaz-Alejandro (1977), which extends the former. A sketch of these two models is presented in the Appendix. The central intuition of this line of analysis is that the relative price distortion entailed by taxation of exports or the imposition of a tariff on imports provides an incentive to produce more of the good that benefits from the resulting protection, and less of the other one, which would be more valuable at world market prices. Typically in many African countries, export crops are severely taxed, while the industrial sector gets some protection, by various mechanisms, like tariffs or tax exemption, etc. Then, by the Rybczinski theorem, an increase in the capital stock will result in an increase in the size of the protected sector, which produces already too much at international prices, and a contraction of the more labour intensive sector, which produces already too little at world prices.

Investment was positive during most of this period, except of course during the war years, including some external funding from France, and growth at domestic prices was regarded as positive, slightly above population growth in the early phase (World Bank, 1971), and is remembered as such by the people who lived through that period. Nevertheless, at both local and international prices, the overall trend seems to be negative, but much less so at local prices, where some recovery seems to occur after the war. Such a divergence can be explained within the Johnson (1967) and Brecher–Diaz-Alejandro (1977) framework, discussed above, by the fact that the export sectors (cotton and cattle) were massively taxed, while the other sectors (import-substitution industry and services), were much less taxed, or even sometimes subsidized. The divergence of the two series shown in Figure 5 after 1984 suggests that the postwar recovery may have entailed some immiserizing growth, of the type described above, as investment may have been concentrated in the protected sector. Similarly, the puzzling de-synchronized dips in the series during the civil war suggest that a wide swing in the relative importance of the different production sectors, which are weighted by very different relative prices in the two series, occurred then.

Collier (1999) offers an analysis of the changes in the sectoral composition of output due to civil war. He emphasizes the role of the stock-adjustment of the capital stock to the political risk as perceived by entrepreneurs. However, the gradual fall in output before the outbreak of the civil war proper in 1979 suggests that the more sporadic violence occurring before that had already damaged the investment climate. Moreover, the end of this gradual fall, or even the recovery at local prices, that is observed after the war, suggests that the stock-adjustment of the capital stock to the risk of war emphasized by Collier (1999) was completed by then. Hence, the shadow of conflict probably grew larger and larger before the war, over nearly two decades, while the war itself did not provide a lot of relevant information for investors.

Nevertheless, the same periods can be clearly identified with the two series, with a roughly similar interpretation, although the post-civil war fall in per capita GDP is much stronger when evaluated at international prices.

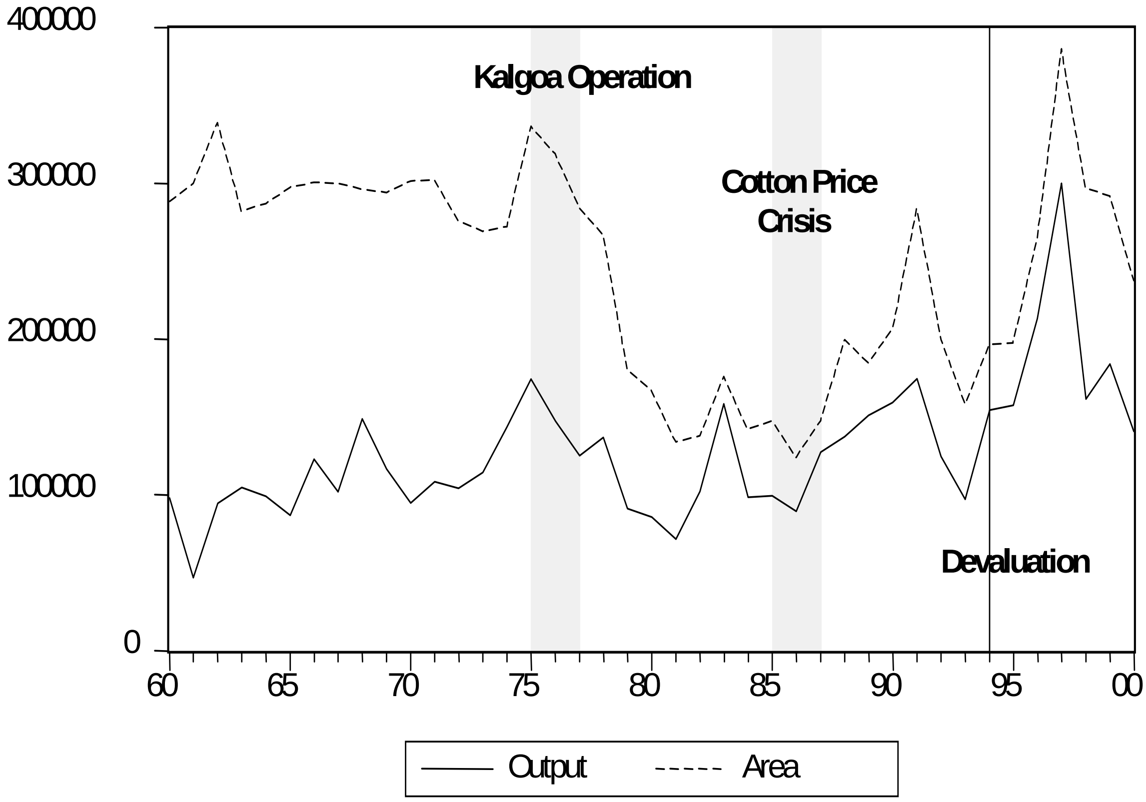
4. THE HISTORY OF THE COTTON SECTOR

The culture of cotton was introduced during the colonial period in 1928, under the forced labour regime. A similar policy was pursued by the French in most Sahelian areas, and Bassett (2001) gives a rich account of the experience of northern Côte d'Ivoire. Many similarities can be found with the case of Chad. In both cases, the evolution of the sector was tightly controlled by a parastatal, which was providing the seeds and other inputs, as well as doing research for selecting the most appropriate seeds and providing extension services. As in most of the Sahelian countries, the French Compagnie Française des Textiles (CFDT) was heavily involved in the sector. In 1971, there is an important change with the creation of Cotontchad, replacing Cotonfran as the firm in charge of the cotton sector. Its capital was owned mainly by the Chadian government, which still owns 75%, the rest being shared between the CFDT, which keeps 19% of the capital, and several local banks, owning together 6%. In 1985, this parastatal met some serious problems because of the fall in the world price of cotton. Output has been limited to 100,000 tons, the producer price has been fixed quite low, at CFAF100, and seven ginning plants had to be closed of the 12 in operation up to that date. It met also serious problems in the early 1990s, until the 1994 devaluation and the rise in world prices helped to restore its financial position. The producer price was then increased from CFAF90 to CFAF120, for the 1994/95 campaign.

During the colonial period, output grew from 18 tons of cottonseed during the 1928/29 campaign to 80,500 tons in 1957/58. After independence, output went from almost 98,000 tons in 1960/61 to 145,750 tons in 2000/2001. This growth is related to that of the average yield per hectare, which has increased steadily as a result of research into the choice of variety and agricultural techniques, which drew largely on the experience of the whole Sahel area, where the CFDT is everywhere present. From 120 kg per hectare on average over 1928–1939, production reached 200 kg during 1940–1950, then 280 kg over 1956–1961. The average yield per hectare in 2000 was 592 kg.

Figure 6 shows the series of the area devoted to cotton and output level. The impact of the civil war is evident on the area cultivated, as well as on the output level, where it must be appreciated against the positive trend characterizing this series. It falls over 1979–1981, while a positive spike occurs in 1983. Just before the war, in 1974/75, a special operation, called the Kalgoa operation, was launched by the government, aiming at pushing output to a record 150,000 tons for that campaign. This was meant to increase revenues for both intensifying the fighting in the north and funding some oil prospecting in the south. It had some positive effects in the following two years, with output reaching 174,062 tons and 147,384 tons, respectively. This chart also shows the impact of the droughts that affected this sector especially in 1970-71 and 1984.

Figure 6: Cultivated area and cottonseed output



Cotton remained the main source of income in the country after independence, as it was during the colonial period, until oil revenue began to flow in 2003. The primary sector, and in particular cotton and livestock, is the mainstay of the Chadian economy. Despite the recent decline, the share of the primary sector in GDP is about 40%, that of industry about 15%, and that of the service sector between 45 and 50%. It follows that GDP is severely exposed to climatic shocks, mainly through cotton and livestock. Cotton employs directly 300,000 households in the southern part of the country. This culture has been the subject of special attention by the successive governments since independence, because it is the main source of fiscal revenues. Cotton is also the main export crop and provides at least 80% of the foreign exchange earning for most of the period, until the recent relative decline. Table 4 and Figure 7 show the series for total exports and cotton exports since 1983. Some of the cotton was transformed locally by the STT (Société textile du Tchad), which was one of the main industrial firms in the country between 1965 and 1991, when it closed down.

Table 4: Exports and cotton exports
In CFAF billion

Year	Total exports	Cotton exports	Year	Total exports	Cotton exports
1980			1991	54.6	24.0
1981			1992	48.2	25.0
1982			1993	45.9	14.5
1983	29.8	23.1	1994	78.7	26.3
1984	47.7	40.7	1995	12.3	63.7
1985	44.7	22.4	1996	12.9	47.0
1986	34.1	14.6	1997	138.1	63.0
1987	32.8	12.3	1998	157.0	78.0

1988	42.9	23.1	1999	150.0	60.0
1989	49.5	23.4	2000	129.4	50.7
1990	52.6	26.0	2001		

Source : BEAC, IMF.

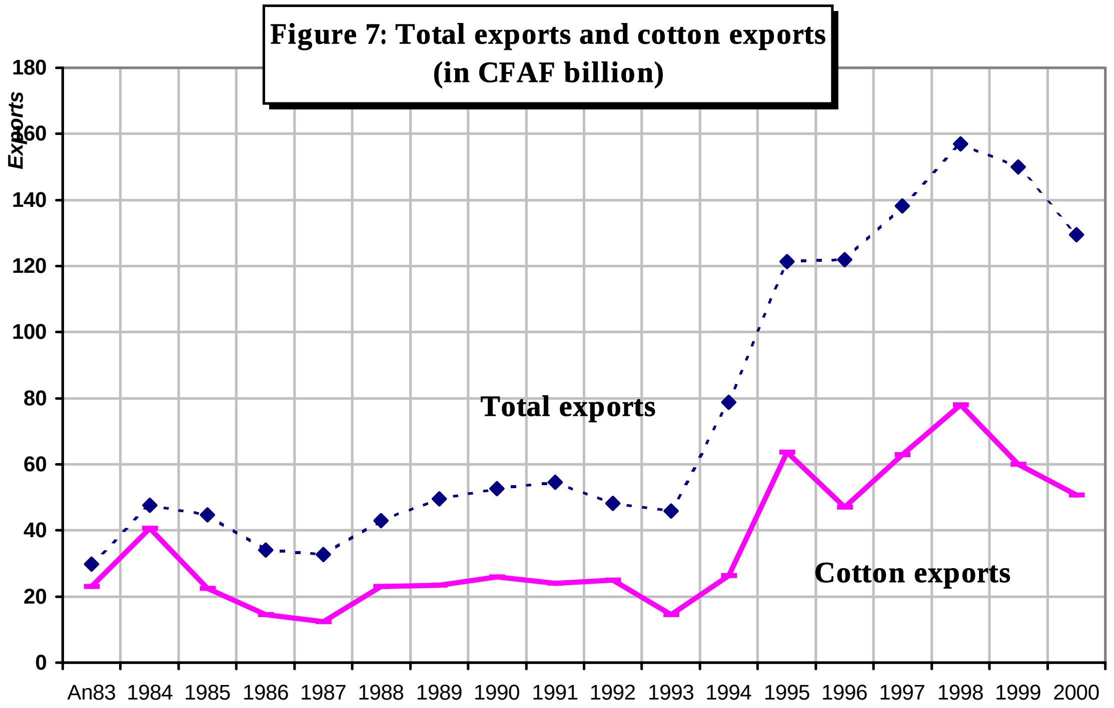


Figure 7: Total exports and cotton exports (in CFAF billion)

The determination of the Chadian government to develop the cotton sector is well illustrated by the 1966–1970 five-year plan. Investment in the production sectors, including rural development and industry, amounted to 42% of the total expenditures of the plan. Some 28.3% of the resources were allocated to the modernization of agriculture, and were almost entirely devoted to the cotton sector, which was meant to provide subsequently the fiscal resources for supporting the state.

The government involvement in the sector did not stop either with the end of this 1966–1970 plan, or with the switch of power to the hands of the northerners after the civil war. The 1985 convention, the 1988 plan-contract, and the decrees 022 and 023/PR/MCI/90 passed on 9 February 1990 were all aiming at restoring the competitiveness of the cotton sector. More recently, the 1994 devaluation gave a new boost to exports, as illustrated by Figure 7, and in particular to cotton exports. Currently, the government is examining the possibility of privatizing the Cotontchad company, and of separating the marketing and ginning functions from the production of oil and soap from cotton seeds.

The government levies three kinds of revenues from the cotton sector:

- Export tax on cotton-fibre exports
- Company taxation and profit tax on Cotontchad
- Dividends

In the days of Cotonfran, the export tax amounted to CFAF17 per kg of cotton fibre exported, i.e., CFAF17,000 per ton. This was changed in 1971 and the government was levying CFAF21,500 per ton of exported cotton fibre, This amount has fluctuated ever since, following the changes in the world price. According to the computations made by Madengar and Farris (1991) for the 1985/86 campaign, the state was levying CFAF53,739 as export tax, CFAF6,060 as levy for the *Caisse Autonome d'Amortissement* (CAA), a direct contribution to the reimbursement of the national debt, and CFAF7,000 for the Office National de Développement Rural (ONDR), a parastatal in charge of rural development. This amounts to a total of CFAF66,799 per ton, i.e., FF1,336 at that time. Table 5 shows the time profile of these revenues over the relevant part of the 1985/86 campaign. It suggests that the harvest is highly seasonal, with two peaks in February and July.

Table 5: Revenues from the export tax on cotton fibre during 1985/86

Month	Quantity exported (tons)	Shares in CFAF thousands			Total
		Treasury	CAA	ONDR	
12–85	4,173	224,253	25,288	29,211	278,753
01–86	5,959	320,232	36,112	41,713	398,057
02–86	7,203	387,077	43,650	50,420	481,146
03–86	2,499	134,282	15,143	17,491	166,916
04–86	3,305	177,604	20,028	23,135	220,767
05–86	2,618	140,693	15,866	18,327	174,886
06–86	2,048	110,043	12,409	14,334	136,786
07–86	9,081	488,017	55,032	65,568	608,618
Total	36,886	1,982,202	223,527	260,200	2,465,929

Source : Madengar and Farris

After the 1985 convention, the government was levying a direct tax, and was leaving 80% of the profit to the Caisse de Stabilisation des Prix au Producteur, i.e., the fund in charge of stabilizing the producer price, and 20% to Cotontchad. This was in turn taxed at 50% by the profit tax, and the rest was distributed to the shareholders, i.e., the Chadian state for 75%. Moreover, as in most other francophone African countries, the resources of the stabilization fund were in fact used to finance various government expenditures, so that one can estimate that behind this administrative veil, the state was in fact levying more than 90% of the profits of the cotton sector.

The cotton sector also produces other fallout for the economy. Although it was initially introduced by force, it has become a major factor influencing the life of most people in the south of Chad. It gives them access to three of the crucial characteristics of a modern economy: credit, technical progress and insurance. Cotontchad provides the various inputs, be they annual ones like seeds, fertilizers and pesticides, or longer lasting ones like ploughs and weeders, at credit. The reimbursement is then recovered directly out of the crop sale. The extension services are provided by the ONDR, which also provides credit for buying the pair of oxen required for cultivation. Animal traction was promoted beginning in 1966 for boosting production. The use of fertilizers and other modern inputs, as well as animal traction and various cultural techniques introduced for cotton, do in fact spill over to other crops. The output of rice trebled over 1966–1995, and a new crop emerged in the 1980s, namely sugar cane, which expanded rapidly (Azam et al., 1999). Lastly, Cotontchad ensures the marketing of the crop, thanks to its own fleet of trucks, at a known price.

Moreover, the cotton sector provides the incentives for the expansion and the maintenance of the road network in the south, with positive spillovers on the local economy. Earth roads are regularly maintained there, unlike in the rest of the country, giving farmers and other producers some access to markets. Schools and dispensaries are created in the neighbourhoods of ginning plants, which benefit primarily the children of the employees of these plants, but also the children of the farmers. There were eight such ginning plants in 1945, rising to 23 in 1966. Since the 1985–1987 cotton crisis, only eight of these plants are still in operation. But some of the attached socio-economic infrastructure remained in operation after their closure. Of course, this bundling of services provided by the local monopsony firm has some well known drawbacks, which have been well identified in the case of transition economies, and is subject to the attacks of the international financial institutions (IFIs), as in many other Sahelian countries.

The cotton sector also ensures some activity to the local banking sector, and to some local transport companies. Each year Cotontchad borrows a short-term campaign credit worth CFAF40 to 60 billion, at a rate of interest of 12% at least, and all the cotton fibre is transported to the port of Douala in Cameroon by private truckers.

No positive externality of this kind has been sustained by the livestock sector in the north of the country, where the involvement of the state has always been more distant. The feeling that there existed a “useful Chad”, in the south, distinct from the “useless Chad” of the north, did a lot to fuel the resentments that eventually led to the civil war, and the transfer of political power from the southerners to the northerners. We now turn to analysing how this happened.

5. THE POLITICAL HISTORY

The southern part of the country, south of the Chari River, was cut off in 1936 from the then Oubangui-Chari territory (now Central African Republic), part of the French Equatorial Africa territory, and added to the Chad territory, in order to provide some fiscal resources to the French administration in Fort-Lamy, now N’Djamena, which could not raise any from what is now northern and central Chad. From independence until the civil war, the country was ruled by southerners, by François Ngarta Tombalbaye first, and then by General Félix Malloum, after the 1975 coup d’état. The latter was regarded with some sympathy by the French government, as Tombalbaye was adopting a fairly independent and despotic attitude, which was raising some concern in Paris. Most of the administrative staff was from the south, because of the educational advantage of the latter, and the northerners perceived some favoritism towards the south.

Endless debates have taken place to determine what caused the eruption of political violence between the north and the south in this country. Many emphasize grievances, and in particular that the northerners had developed a sense of superiority over the southerners, because the nomads have for centuries used the south as a reserve for slaves, which they captured occasionally by raiding the villages south of the Chari River. This would explain the resentment of uneducated northerners faced with a post-colonial government dominated by southerners (e.g., Lanne, 1996). But this view is refuted by Roné (2000), who points out that the capture of slaves was (is?) a reciprocal exercise that all groups perform to the detriment of all other groups, and even within each group between neighbouring villages. Lanne (1996), a former French administrator from the colonial period, recalls that various skirmishes between the northerners and the southerners erupted well before independence. Riots took place between southerners and northerners in 1946 and 1947 in Fort Lamy (now N’Djamena) and Fort-Archambault (now Sarh) in the south. In particular in 1947 in Sarh, the fight was led on the southern side by a schoolmaster named…François Tombalbaye, and they were seeking revenge for some insults addressed by northerners at the southerners, during a political meeting. At that point, the flooding of the civil service by the southerners was far from evident.

In fact, the French administration was rather perceived as favouring the northerners during the colonial period, reflecting the traditional fascination by desert people that explains to some extent the pattern of the French penetration in Africa, from Sénégal eastward. The first Chadian civil servants were Muslims from the north: Hanoun Othman and Béchir Sow, in the 1920s. The first schools were created in the north, in the 1920s (Lanne, 1996). At that time, the south was still part of the Oubangui-Chari territory, where the French were not pursuing such a development policy. As late as 1966, when the rebellion started to gain momentum, more than 55% of the medical infrastructure was in the north, as shown by Table 6. This attraction was in fact one-sided, however, as the northerners voluntarily kept their distance from the French schooling system, where neither Arabic nor the Koran were taught, and where boys and girls were educated on a par, side by side. Then, after the French in 1956/57 imposed a law on the civil service that made recruitment dependent on competitive exams, “à la française”, open only to educated people, 70 to 80% of the civil servants turned out to be from the south.

Table 6: Distribution of health infrastructure between the north and the south in 1966

	Hospitals	Medical centres	Infirmaries	Dispens-aries	Epidemiolo-gical units	Polyclinics	Social Centres	Total
North	2	6	19	51	5	1	6	90
South	2	5	8	42	3	0	3	63
Total	4	11	27	93	8	1	9	153

Source: Diguimbaye and Langue(1968).

Hence, a fairly natural selection process led the southerners to hold the government at independence. Then, the challenge was to build a nation under the threat of ethnic conflict. As shown by Azam (2001) and Azam and Mesnard (2001), the crucial factor of such a process, when the government does not exert an obvious military domination on the excluded group, is to put in place a credible redistribution system in favour of the excluded group. The aim of such a system has nothing to do with philanthropy, and is rather to give to the potential rebels, while avoiding the social costs of war, at least as much as what they could capture by waging a war. In Côte d'Ivoire, for example, the high wages of the civil service, combined with a policy of broad based education, selecting elites from all the groups, played a large part in such a framework (Azam and Koidou, 2002).

The reluctance of the northerners to join the French schooling system closed that avenue for credible redistribution in favour of northerners. As discussed above, in connection with the history of the cotton sector, most of the investment in infrastructure was consistently done in favour of the "useful Chad", with very little benefit to the north, where the social rate of return was admittedly much lower, from a narrow economic point of view. This closed a second major potential avenue for redistribution across regions. The only avenue left was patronage, a common system in most African countries, with power sharing in government aimed at making it as credible as possible. Tangri (1999) provides a richly documented analysis of patronage in several anglophone countries that sheds light on the various possibilities that were probably still open to the Chadian government, had it wished to use them.

However, other aspects of the government's behaviour suggest that François Tombalbaye was not convinced of the value of such a redistribution policy, and was rather paying only lip service to the regional balance between ethnic groups. This was noticed very early by some observers. Hence, in its 1971 *Country Economic Memorandum*, the World Bank wrote: "the question of livestock taxation occupies an important place in the conflict between northern and southern population groups" (World Bank, 1971: 7). Adding the cattle head tax to other levies bearing on the livestock sector, this report estimates the contribution of this sector to public finance at CFAF631 million in 1966, while the cotton sector, the main foreign exchange earner, was contributing only CFAF90 million in the same period. Many observers deny that economic motivations triggered the uprising of the northerners, however, pointing out in particular that the head tax on livestock had been created by the French colonial authority in 1910 (Roné, 2000). Nevertheless, although local chiefs in the north collected the taxes on behalf of the government, partly deflecting the potential resentment, the imbalance in tax revenues certainly aggravated the tension between the two groups. Moreover, the government issued bonds in 1964, for borrowing money locally for the first time, making it compulsory for all Chadians to subscribe. Poor farmers and herders perceived this as a doubling of their tax liability (Lanne, 1996). Some southern cotton growers committed suicide in desperation, seeing their yearly income soaked up by this levy. In the north, the response was more positive, as many were soon to take to the bush and join the rebellion.

The most spectacular political events happened just after the creation of the single party, the Parti Progressiste Tchadien (PTT). Initially, before independence, this was just the local branch of the Rassemblement Démocratique Africain (RDA), the party that nurtured the whole political elite of most francophone African countries before and after independence. As he became president in 1962, Tombalbaye was aiming at turning it into the only party, as this was done in so many other countries in Africa at the time. The northerners were very wary about this move, and many of them were in favour of keeping a separate political party for them. Tombalbaye won initially, however, and the principle of a single party was adopted at a plenary congress in Fort-Archambault in January 1963. The national political board of this new party was manned equally by northerners and southerners.

However, a small number of northerners had turned down the offer to join, and the prestigious Minister of Foreign Affairs had to be replaced one month later. Tombalbaye chose a southerner to replace this important political leader from the north, a move regarded as a flagrant violation of the principle of regional balance. Many separate meetings were convened by the northerners, which Tombalbaye tried to prevent. A series of arrests and condemnations followed, and this sealed the fate of the consensual single party. On 16 September 1963, the northerners organized a march that received a fierce repression, killing a few demonstrators, leading to the arrest of three more political leaders from the north. Dissidence started in the north less than two years later, leading eventually to the civil war and the replacement of the southerners by the northerners at the head of the country.

Tombalbaye became gradually more and more despotic, and lost most of his support. In a strange attempt to reduce the weight of the religious antagonism, he tried to force a return to the roots, and to impose traditional initiation on all the southerners. Several resisting Christians, mainly Protestants, were summarily executed. This is the time when he took the title of “Ngarta”, normally reserved to traditional chiefs. He was overthrown by a coup d’état on 13 April 1975, led by General Félix Malloum, a prominent southerner. The latter tried to launch a policy aiming at restoring some regional balance between the north and the south. He thus chose Hissein Habré, one of the leaders of the rebellion movement in the north, to become his prime minister.

Habré accepted this attempt at finding a more acceptable political system for involving the northerners in the sharing of the benefits from power, and this aroused a lot of hopes. A new constitution organizing the sharing of power between the president and the prime minister was passed on 29 August 1978. French Prime Minister Raymond Barre sent a telegram of congratulation. However, the two men failed to get on, as Habré turned rapidly into a radical aiming at cleaning up the “stables”, and fighting corruption by drastic measures. The old guard of southern civil servants felt naturally under threat. The civil war broke out on 12 February 1979 and a lot of fighting took place in N’Djamena. Inter-ethnic massacres occurred and the state collapsed. The new constitution, probably enacted too late, thus turned out to be a Trojan horse, rather than the seal of a new alliance.

Ever since 1965, a low intensity insurrection had been going on in the north, structured by the Frolinat (Front de Libération Nationale du Tchad), led by the two Toubou rivals, Goukouni Oueddeï and Hissein Habré. Goukouni is the son of the highest traditional authority of his group, the Gedré, while Habré is from a lower caste of the same group, the Goranne. A finer ethnic division is sometimes used to distinguish the Tedas and the Dazas among the Toubous. Goukouni Oueddeï is a Teza, from the very north, south of the Libyan border, while Hissein Habré is a Daza, from the east, by the border with Egypt and Sudan (Azam et al., 1999). The former has developed some very close relationships with the Libyan ruler, Khadafi, while the latter is an inflexible nationalist who has always fought hard to keep Khadafi out of Chad. This got him at times a serious US support, providing France with a competitive pressure to adopt a firm stance over these matters, and to provide him with the required military support, delivering arms and discreet help with “technical advisors”, when it came to push the Libyan army out of the country. Habré lost the French support by selling the captured high-tech Soviet military hardware to the US in 1987, without letting the French have a look at it. He was thus dumped by Paris when Idriss Déby launched an attack from the Sudanese territory and seized N’Djamena very quickly in 1990.

The latter comes from the Zarghawa group, whose territory lies on either side of the Sudanese border, with only about 30 to 40% of its population living inside Chad. The presidential guard is thus staffed nowadays with a large proportion of Sudanese Arab-speaking elite soldiers. The Zarghawa are Muslim Arab speakers, with natural relations with the Goranne. A blow-by-blow account of the extremely complicated game of alliances and antagonism between the different players during the first 30 years of independence, which has at times a chaotic flavour, is provided by Lemoine (1997), and falls outside the scope of the present study. To illustrate the complexity of the situation, Habré was in turn the last prime minister of the Malloum days, while the latter was trying to avoid the war, and the second president of the postwar period, until 1990. This occurred when the northerners began to rule the country, after a short interim leadership of Goukouni. Until the civil war proper, most of the fighting took place in the northern half of the country.

After the civil war, the country was not perfectly peaceful either. Besides the failed Libyan invasion described above, this period saw a lot of military activity in the south. The “codos” rebellion movements emerged in the south from 1983 to 1986, and then from 1992 to 1999 (Roné, 2000). This triggered two massive waves of very harsh repression, first by the Habré government and then by the Idriss Déby one. These involved a lot of massacre of innocent civilians, many villages being burnt to ashes and deleted from the map. Buijtenhuijs (1998) does not hesitate to characterize these massacres as "genocidal". He estimates that more than 1,000 southerners were killed every year during those two episodes. As seen above in the econometric exercises, the massacres perpetrated in the south made a significant dent in the growth history of this country.

Moreover, over-armed herders from the north, where most of the fighting took place for more than a decade, started to cross the Chari River in order to feed their cattle in the cotton fields, shooting dead with impunity the resisting farmers. Neither the administration nor the judicial authority, now dominated by the northerners, would take any action against this type of roving banditry, because quite a lot of these cattle are in fact owned by high-ranking officials. Thus, the crime can be viewed now in the south as "the continuation of war by other means". This only became possible after the donors funded a massive project for eradicating the tsetse fly, which for centuries provided a natural protection for the south against the vagrant herds and the entailed extension of the desert. There are no precise estimates of the number of southern peasants who have emigrated to neighbouring Cameroon, Central African Republic and Nigeria.

However, to the surprise of most observers, the northerners got the majority in the electoral census prior to the 1996 elections (see Buijtenhuijs, 1998). Some claim that many farmers have deserted their fields because of this threat, and that this is the root cause of the ending of the post-devaluation cotton-led boom. No data are available to examine statistically the exact significance of these claims, as most of these assaults are left unreported.

Nevertheless, the Déby regime is rightly regarded as a more satisfactory regime, which lives on since 1990. The key to its relative success is that it has established some regional balance at the head of the state, what Tombalbaye had consciously destroyed, probably over-estimating his political or military strength, and Malloum attempted too late, when Habré was already too strong. Déby chose Kamougué, the general who organized resistance in the south during the civil war and the subsequent massacres, as the president of the national assembly. This is formally the second position in the state hierarchy, and Kamougué represents a genuine personal power, as well, as he could mobilize several military units in case of need.

In addition, some decentralization was adopted with the new constitution approved by referendum on 31 March 1996. Three levels of local governments are created on the French pattern, with communes (both rural and urban) at the bottom, departments at the intermediate level and regions. Hence, Déby based his peacekeeping strategy partly on credible power sharing with the southerners, and thus succeeded in halting the downward spiral that characterized the economy before the civil war. Moreover, we saw above that the economy partly recoveredin the 1990s, with some positive growth of per capita GDP, when measured at local constant prices. In the oil sector at least, investors have now recovered enough confidence to launch the exploitation of the oil fields, more than 25 years after their discovery. This strategy of regional balance was reinforced in April 2001 by the selection as prime minister of Nagoum Yamassoum, a southerner, while Déby was re-elected in May 2001, with 67.35% of the votes.

It remains to be seen, however, whether the flow of oil money into the public coffers will leave this equilibrium untouched, or whether it will trigger a new round of political violence, aiming at determining the shares of the spoils going to each group. The Chadian national assembly passed a law, on 30 December 1998, aiming at providing various guarantees about the use of the oil money. It allocates the various direct or indirect revenues from oil to different accounts in the government budget, in an attempt to avoid sneaky diversions of the money. Moreover, it creates a watchdog, called the Collège de Contrôle et de Surveillance des Ressources Pétrolières, in charge of monitoring the use of the oil money. A law passed on 21 June 2000 reinforces the presence of civil society in this supervision committee, beside the representatives of parliament, the central bank and treasury, the supreme court, etc. Nevertheless, in view of the sporadic violence that is going on in some parts of the country, epitomized by the killing of the chief of staff of the Chadian army in an ambush in the north of the country in early 2001, it seems that peace and the enforceability of this legal device are jointly determined.

5. CONCLUSION

The growth experience of Chad provides a lot of lessons for understanding the political economy of African development. It was based for most of its post-colonial history on a heavily controlled and taxed export crop sector, whose evolution was in fact driven by a parastatal company. This was only concerning a small part of the country, the “useful Chad” in the south, while the rest was left with minimal state presence, and no spillovers from the relative prosperity of the south. Independence gave the political power to the southerners, who had benefited from the French presence by giving rise to an educated elite that controlled the state apparatus. The southerners failed to understand the need to share a bit of their prosperity with the powerful northerners, made more efficient at fighting by their nomadic life and their involvement in livestock. It has been known since time immemorial that nomadic herders are better at fighting than sedentary farmers, and the great Arab social thinker of the fourteenth century, Ibn Khaldun, emphasized it in Al Muqqadima (1392). Herders are better at fighting for two reasons. First, they are generally poorer than farmers, so that their opportunity cost of labour is lower. Moreover, herding is more uncertain, and climatic shocks like drought have always pushed them occasionally into relying on “razzia” (raiding) for their survival. Second, Keegan (1994) emphasizes that spilling blood is part of the everyday life of herders, while sedentary farmers tend to develop a specialized caste or profession of butchers that relieves them of this unpleasant task. He believes that this makes the former more determined fighters, who can kill human beings more spontaneously.

The exclusion of the northerners from the sharing in the spoils of the peaceful economy resulted in a long-standing state of political violence, which could only be restricted to the north until the 1979–1984 civil war. Then, massacres were perpetrated in the south, in 1982–1984 by the Habré government, and in 1993 by the Déby government, entailing the destruction of many villages, wiped out by the mass killing. This entailed also a fall in cotton production, the mainstay of this economy. Some form of democratization took place under Idriss Déby, and some protection of the political rights of the southerners was made credible by the election as president of the National Assembly of General Kamougué, who has been consistently the main leader of the southern resistance since the beginning of the civil war. He is known to be able to raise rapidly some military units that would still give the south some chance of resisting a massive attack by the northerners. As a result, some economic recovery took place after the civil war, which halted the downward slide of the pre-war era. However, this recovery is more noticeable when GDP is measured at constant local prices than at international prices, at which a mere stagnation is observed.

Nevertheless, this protection of the rights of the southerners is still far from perfect, as many vagrant herders from the north have been reported crossing the Chari River for leading their herds to graze in the cotton fields of the south, and on many occasions killing the resisting farmers. This is made possible by two factors. First, the herds can now survive in the south because donors have funded a programme for eradicating the tsetse fly, which provided a natural protection against this type of invasion for centuries, and second, these herders now benefit from an almost perfect impunity, as the political power, including the judiciary system, is now dominated by northerners. Moreover, as oil revenues are expected to flow in the near future, the protection of the cotton growers is losing some of its previous prominence, and becomes gradually a concern of secondary importance.

APPENDIX: THE JOHNSON–BRECHER–DIAZ-ALEJANDRO IMMISERIZING GROWTH MODEL

The impact of trade policy on the returns to capital accumulation has been brought out forcefully by Johnson (1967), who shows that a tariff protecting the capital intensive sector of a standard Hecksher–Ohlin two-sector trade model can result in capital accumulation having a negative impact on the international purchasing power of the country. Brecher and Diaz-Alejandro (1977) extended this model by showing that this impact is necessarily negative if the additional capital is imported. These results gave a fatal blow to the doctrine of import-substitution policy, and the related "tariff-jumping" industrialization strategy. They can be presented very simply as follows. Let

$$q = x + p\,z \;\text{ and }\; q^* = x + p^*\,z \tag{A1}$$

represent GDP per capita at domestic and international prices, respectively, where x is the per capita output of the labour-intensive sector, and z the per capita output of the capital-intensive sector, both assumed strictly positive, p and p^* being the domestic and international relative producer price of z, taking x as the numeraire. We assume typically that $p > p^*$, either because of the trade policy protecting the capital intensive sector, or because the x-sector is heavily taxed, as is typical of poor countries exporting agricultural products. Using duality theory, perfect competition ensures (see e.g. Dixit, 1976) :

$$q = q(k, p), \text{ with } \frac{\partial q}{\partial k} = r(k, p) \;\text{ and }\; \frac{\partial q}{\partial p} = z(k, p), \tag{A2}$$

where k is the per capita capital stock and r is the domestic rental rate of capital. From A.2, it is easily shown that $q^* = q(k, p) + (p^* - p)\, z\,(k, p)$, so that:

$$\frac{\partial q^*}{\partial k} = r + (p^* - p)\,\frac{\partial z}{\partial k}\,. \tag{A.3}$$

By the Rybczinsky theorem, $\frac{\partial z}{\partial k} > 0$, so that the impact of capital accumulation on q^* is ambiguous, as $p^* - p < 0$. This ambiguous impact is the core of the contribution made by Johnson (1967).

Now, assume that the capital stock is partly owned by foreign residents, so that:

$$k = k_D + k_F, \tag{A4}$$

where k_D and k_F are, respectively, the domestic and foreign capital stocks. Then, per capita national income at domestic and world prices respectively may be written as:

$$y = q - r\,k_F \;\text{ and }\; y^* = q^* - r\,k_F, \tag{A5}$$

so that:

$$\frac{\partial y^*}{\partial k_D} = r + (p^* - p)\frac{\partial z}{\partial k_D} \;\text{ is ambiguous and }\; \frac{\partial y^*}{\partial k_F} = (p^* - p)\frac{\partial z}{\partial k_F} < 0\,. \tag{A6}$$

Hence, the impact of domestic investment on national income at international prices is ambiguous, while the impact of foreign investment is necessarily negative in this case. This is the contribution made by Brecher and Diaz-Alejandro (1977). The intuition for these results is that the price distortion provides an incentive to invest the additional capital in the sector whose production is inefficient at international prices, being already produced too much relative to the optimum, and this entails a contraction of the efficient sector, as labour is reallocated.

References

Azam, Jean-Paul. 1991. "Niger and the naira: Some monetary consequences of cross-border trade with Nigeria". In Ajay Chhibber and Stanley Fischer, eds., *Economic Reform in Sub-Saharan Africa.* Washington, D.C.: The World Bank.

Azam, Jean-Paul and Constant Koidou. 2002. “Rising threats: Containing political violence in Côte d’Ivoire”. Paper presented at the World Bank/Yale University Conference on The Economics and Politics of Civil War, Yale University, 13-14 April.

Azam, Jean-Paul and Alice Mesnard. 2001. “Civil war and the social contract”. Paper presented at the Royal Economic Society Annual Conference, University of Durham (England), Special Session: Ending War: Insight from Economics” . Organized by WIDER, 9–11 April 2001.

Azam, Jean-Paul, Christian Morrisson, Sophie Chauvin and Sandrine Rospabé. 1999. *Conflict and Growth in Africa. Vol .1: The Sahel.* Development Centre Studies. Paris: OECD.

Azam, Jean-Paul and Waly Wane. 2001. “The 1994 devaluation and poverty in the WAEMU”. The World Bank,Washington, D.C., April 2001.

Banerjee, Anindya, Juan Dolado, John W. Galbraith and David F. Hendry. 1993. *Co-Integration, Error-Correction, and the Analysis of Non-Stationary Data*. Oxford: Oxford University Press.

Bassett, Thomas J. 2001. *The Peasant Cotton Revolution in West Africa: Côte d’Ivoire 1880–1995*, Cambridge: Cambridge University Press.

Brecher, Richard A. and Carlos F. Diaz-Alejandro. 1977. “Tariffs, foreign capital and immiserizing growth”. *Journal of International Economics*, 7: 317–22.

Buijtenhuijs, Robert. 1998. *Transitions et élections au Tchad 1993–1997: Restauration autoritaire et recomposition politique*. Paris: ASC-Karthala.

Centre culturel Al-Mouna. 1996. *Conflit Nord–Sud: Mythe ou réalité?* Paris: Sépia.

Collier, Paul. 1999. “On the economic consequences of civil war”. *Oxford Economic Papers,* 51: 168–83.

Diguimbaye, George, and Robert Langue. 1968. *L’essor du Tchad* Paris: Presse Universitaire de France.

Dixit, Avinash K. 1976. *The Theory of Equilibrium Growth.* Oxford: Oxford University Press.

Easterly, William and Ross Levine. 1998. “Troubles with the neighbours: Africa’s problem, Africa’s opportunity”. *Journal of African Economies,* 7(1): 120–42.

Johnson, Harry G. 1967. “The possibility of income losses from increased efficiency of factor accumulation in the presence of tariffs”. *Economic Journal*, 77(March): 151–54.
Keegan, John. 1994. *A History of Warfare.* London: Pimlico.

Lanne, Bernard. 1996. “Conflits et violences au Tchad”. *Afrique contemporaine*, 180: 52–61.

Lemoine, Thierry. 1997. *Tchad 1960–1990: Trente années d’Indépendance.*: Paris: Lettres du monde.

Roné, Beyem. 2000. *Tchad: L’ambivalence culturelle et l’intégration nationale.* Paris: L’Harmattan.

Tangri, Roger. 1999. *The Politics of Patronage in Africa.* Oxford: James Currey.

World Bank. 1971. *Current Economic Situation and Prospects of Chad.* Report AW-24a, 9 April 1971. Washington, D.C: The World Bank.