

# **Fiscal Capacity and Dualism in Colonial States: The French Empire 1830-1962**

Denis Cogneau, Yannick Dupraz and Sandrine Mesplé-Somps

## **Appendix 4 – Income distribution in French colonies and estimates of the fiscal burden on Europeans and autochthons**

We attempt to estimate the distribution of the fiscal burden in the French empire, not only between Europeans and autochthons, but also, within autochthons, between the poor, mostly subsistence farmers, and the non-poor, those who took part in the formal sector and were therefore more likely to contribute to modern taxation like the income tax or taxes on sales revenue. To obtain the fiscal contribution of each group (Europeans, the autochthonous non-poor, and the autochthonous poor), we first estimate their income share in total income. We then make assumptions on the incidence of the different tax instruments on each group. The exercise remains speculative, as available data are patchy and many assumptions are needed. Estimates for 1955 are more reliable than for 1925.

### *Income shares of Europeans and autochthons in 1955*

We first estimate the share of European settlers in national income. Data availability makes this estimation easier for 1955 than for 1925.

In North Africa, the social tables we use to estimate income shares include Jews in the group of European settlers (in Algeria, Jews were granted French citizenship in 1870). For comparability, we also include the Chinese and Indian minorities in Madagascar in the group of European settlers. In Indochina, the Chinese population, far more numerous than the European population, is treated as autochthonous.

For the year 1955, Samir Amin gives estimates of the income shares of European settlers (and Jews) in Algeria (47%), Morocco (37%), and Tunisia (43%), drawing from household consumption surveys, studies on agricultural incomes and estimates of savings (Amin 1966, pp.114-117). Using these figures and our estimates of GDP per capita and population shares, we estimate the income per capita of Europeans in Algeria, Morocco and Tunisia at respectively 11,850, 10,300 and 12,000 francs (all figures in 1937 PPP terms). This is to be compared with a GDP per capita of 13,900 in Metropolitan France. It seems plausible that average incomes in Metropolitan France and of Europeans/Jews in North African

colonies were close, as the occupational structure of Europeans/Jews in North Africa was similar to the French occupational structure (Amin 1966, pp. 156-158, 167-168, 177).

In the cases of Tunisia and Algeria, we can check the consistency of these figures with income tax tabulations collected by Alvaredo, Cogneau and Piketty (2020). In 1955 Tunisia, they give the average income of those eligible to pay the income tax, who represented the 39% richest of the group of Europeans (excluding Jews). To recover the income per capita of the whole group, including those who did not pay the income tax, we assume that the income distribution of Europeans in Tunisia was the same as in Metropolitan France (taken from the WID.world database<sup>1</sup>). We find an average income per capita of 10,700, not far from the above estimate of 12,000 using Amin's share. In 1955 Algeria, income tax tabulations do not distinguish Europeans, or non-Muslims, from Muslims. Yet, we can assume that almost all of those rich enough to pay the income tax were Europeans or Jews — in 1955 Tunisia, non-Europeans represented just 26% of those eligible to pay the income tax, and it is not impossible that a majority of them were Jews. Then, assuming again that income distribution among Europeans/Jews was the same as in Metropolitan France, we obtain an income per capita of 12,300, very close to our 11,850 figure.

For other colonies, we start from Amin's estimates of income by group in 1959 Senegal and 1950 Côte d'Ivoire (Amin 1971, pp. 48, 62, 96-98); the income of Europeans is estimated as the total of wages, benefits of medium and small-size firms and housing rents in the foreign sector ("*secteur étranger*"). Europeans earned on average 25,250 francs in Senegal (20% of total income for 1.5% of population) and 49,800 francs in Côte d'Ivoire (19% of total income for 0.5% of population). European settlers in Senegal represented the majority of Europeans in AOF (53%), and they were on average less skilled than in the rest of the federation. Côte d'Ivoire was also the second wealthiest colony in AOF after Senegal. Europeans living in other colonies of AOF were likely more similar to those in Côte d'Ivoire than to those in Senegal; yet they also likely earned less, so that we estimate their average income per capita by applying the same ratio (41) to average GDP per capita as in Côte d'Ivoire. We obtain, for the whole AOF, an average European income of 30,228 francs and a European income share of 12% (for less than 0.4% of population). In other African colonies we assume that the average income per capita of Europeans was the same as in AOF in nominal terms and only adjust for differences in price levels. We estimate European income shares at respectively 4, 14 and 9% in Togo, AEF and Cameroon, which gives for the whole of West and Central

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<sup>1</sup> <https://wid.world>

Africa an income share of 12%, and an average European income of 29,118 francs, twice the GDP per capita of Metropolitan France (Table A4.1). In Madagascar where Europeans/Asians represented a much larger share of the population (1.5%, with Asians representing less than a third), we estimate that they earned 27% of total income, with an average income of 19,434 francs.

### *Income shares of Europeans and autochthons in 1925*

In 1925 Indochina, income tax tabulations from Alvaredo, Cogneau and Piketty (2020) cover almost all Europeans and provide us with a direct estimate of their income share: 9%, for 0.13% of the population, corresponding to a very high income per capita of 44,500 francs (all figures in 1937 PPP terms). Note that a similar calculation for 1945 indicates a decrease in income per capita to 16,000 francs, as the economy was collapsing during the war, and a lower income share of 7%.

In the other colonies, we lack data on the distribution of income in 1925. To obtain European income shares, we assume that the income per capita of Europeans grew at the same rate as local GDP per capita between 1925 and 1955; in other terms, we assume that the income share of Europeans moved in line with their population share. We tried more sophisticated calculations isolating the public sector, and making use of our public wage and employment data. However, everywhere civil servants never represented more than 30% of total European employment and most often no more than 15%<sup>2</sup>; furthermore, the growth in real public wages was not entirely at odds with that of GDP per capita. As we have no additional information on private incomes to bring in, we prefer to stick with the simplest assumption. We obtain income shares of respectively 66, 17 and 49% for Europeans in 1925 Algeria, Morocco and Tunisia. Income tax tabulations for 1932 Algeria provide us with a check; assuming that all eligible taxpayers were Europeans/Jews (the top 19% richest) and

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<sup>2</sup> In North Africa, the share of Europeans in public employment is estimated at 60% in 1925 and in 1955. This figure is consistent with Amin's for 1955 (pp.153, 161 & 174: 67% in Algeria, 60% in Tunisia & Morocco), and with a 62% figure from the 1936 population census of Algeria. Yet only a small minority of Europeans worked in the public sector, the maximum share being 12% in 1955 Morocco. For 1925 Madagascar, we know the share of Europeans in total public employment: 12% (Table A5.1, Online Appendix 5), and even in each administrative subsector. For 1955, we estimate the number of French civil servants by applying the 1925 shares (the 1946 shares are very similar) to the 1955 distribution of employment by subsector; we find that Europeans made 12.9% of total employment (12% in 1946, Table A5.1, Online Appendix 5). Yet, as the population share of Europeans nearly doubled, the weight of the public sector in European employment went down from 10 in 1925 to 5% in 1955. For the colonies of West and Central Africa, we apply the same procedure and estimate that Europeans represented 9% of public employment in 1925, and 12% in 1955. The share of the public sector in European employment is then estimated at 28% in 1925 WCA, and again goes down to 18% in 1955 with migration inflows to the private sector; our estimate for 1955 Cameroon fits with the share of civil servant households according to a European census in 1938.

that the income distribution was the same as in 1925 France, we obtain the same income share (65%) as with our estimation procedure. In contrast with 1955, European income in Algeria lay above French GDP per capita (10,200 vs. 8,800), close to it in Tunisia (9,700) and below in Morocco (6,700). In 1925 Madagascar, we estimate a European income share of 14.2% for 0.81% of the population, corresponding to an average income per capita of 13,615 francs (Table A4.1). Last, for 1925 West and Central Africa, we estimate an income share of 2.7% for 0.08% of the population, and an average income of 17,705. Hence, according to these very tentative estimates, French settlers in Sub-Saharan Africa were richer than the French average, by 40 to 80%, but it was only in Indochina that settlers were extremely rich, earning five times the French GDP per capita.

Table A4.1 — Income distribution estimates for the years 1925 and 1955

	N. Afr.	Indochina	Madag.	WCA
<b>Year 1925</b>				
Europeans: Population share (%)	9.19	0.13	0.81	0.08
Income share (%)	49.3	8.7	14.2	2.7
Average income per capita (FF 1937 PPP)	9,629	43,837	13,615	17,705
Non-Europeans Average income (FF 1937 PPP)	1,004	578	677	531
<b>Year 1955</b>				
		<b>Year 1945</b>		
Europeans: Population share (%)	8.37	0.16	1.54	0.36
Income share (%)	41.1	7.4	26.8	11.8
Average income per capita (FF 1937 PPP)	11,709	15,855	19,434	29,118
Non-Europeans Average income (FF 1937 PPP)	1,531	327	830	801

**Notes:** N. Afr.: North Africa; WCA: West and Central Africa. **Sources:** Social tables from Samir Amin (1966 and 1971), income tax tabulation data from Alvaredo, Cogneau and Piketty (2020). **Notes:** Europeans include Jews in North Africa, and Indians and Chinese in Madagascar.

#### *Income and population shares of the autochthonous poor and non-poor*

In a second step, we endeavor to break down the autochthonous population in two social classes: the “non-poor” and the “poor”. The autochthonous non-poor will be assumed to pay what we call modern taxes, whereas the poor, mostly subsistence farmers, will be assumed to pay none. As data are even scarcer for this second step, we restrict ourselves to Algeria, Tunisia, and AOF.

For 1955 North Africa, Samir Amin provides population and income shares for rural and urban Muslims in each colony (Amin 1966, pp. 114-117).<sup>3</sup> He also provides a three-class

<sup>3</sup> We checked that Amin’s figures are consistent with data from the population census of Algeria in 1954 and of Tunisia in 1956: Muslims in municipalities with more than 20,000 inhabitants make respectively 16.5% and 15.2% of total population. In Tunisia, Muslims in the 10,000-20,000 range make an additional 6.4%.

population and income breakdown of the rural and urban societies (pp. 130, 136, 141, 155-156 and 166). Our “non-poor” group is composed of the two richest classes of the urban Muslim population and the richest class of the rural Muslim population (wealthy farmers). Our “poor” group is composed of the two poorest classes of the Muslim rural population and the poorest class of the Muslim urban population (servants and unskilled laborers). We obtain that the autochthonous non-poor make 16% of the population and earn 24% of income in Algeria. They make 20% of the population and earn 30% of income in Tunisia. Their average income is about a third of the average European income and four times as high as the average income of the poor (Table A4.2).

Amin also provides estimates of the share of urban Africans in population and income for 1959 Senegal and 1950 Côte d’Ivoire. In absence of a more detailed breakdown, we use the urban share to estimate the share of the non-poor. We treat Côte d’Ivoire as representative of other AOF colonies and take a population weighted average of the shares. From this we estimate that the African non-poor in AOF made around 11% of total population and 36% of total income in 1955. It means they earned about the same income as the Muslim non-poor in North Africa, ten times less than the tiny minority of European settlers, and five times more than the African poor (Table A4.2).

Building estimates for 1925 is quite a heroic task. In North Africa, to estimate the population share of the non-poor, we estimate the urbanization rate of the Muslim population and assume the same share of rural non-poor and of urban poor as in 1955.<sup>4</sup> In AOF, we use the urbanization rate computed from Africapolis to estimate the share of the African non-poor (see also online Appendix 1 on urban population figures).<sup>5</sup>

Finally, to break down the estimated income share of the autochthonous population into the shares of the non-poor and the poor, we make the simple assumption that the income per capita of the non-poor grew at the same rate as the income per capita of all autochthons; in other terms, we assume that the income share of the non-poor moved in line with their population share among autochthons. To check that we obtain plausible estimates of average income, we compare the figures of Table A4.2 with the price of a yearly ration of 1,600 kcal of wheat (584 francs in Algeria, 575 in Tunisia, 474 in AOF). In Algeria and Tunisia the

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<sup>4</sup> The 1926 Algerian population census indicates that only 11% of the Muslim population live in the 46 biggest cities. The 1921 Tunisian population census reports the number of Muslims for the five biggest cities only. We assume the ratio of Muslims to non-Muslims in the 24 smallest cities to be the same as in the four biggest cities outside of Tunis. We obtain that 10% of the Muslim population lives in the 29 largest cities.

<sup>5</sup> <https://africapolis.org>. We thank Eric Denis for sharing unpublished data on AOF before 1950. We interpolate Africapolis estimates between 1920 and 1930. We obtain an urbanization rate of 1.7%, vs. 1.3% if we take Eggiman’s figures (Eggiman 1999).

average income of the poor lies 20% above the price of a yearly ration. In AOF, it lies 7% below. According to the estimates presented in Table A4.2, income inequality increased sharply in AOF between 1925 and 1955, in parallel with the urbanization boom. In the two North-African colonies, the evolution is more ambiguous: while the income gap between Europeans and autochthons narrowed, it seems that inequality among autochthons increased.

Table A4.2 — Income distribution estimates for the years 1925 and 1955

	Algeria	Tunisia	AOF
<b>Year 1925</b>			
Europeans: Population share (%)	14.41	9.49	0.09
Income share (%)	65.8	49.4	3.2
Average income per capita (FF 1937 PPP)	10,214	9,672	18,503
Autochthonous non-poor: Pop. (%)	10.9	17.4	1.7
Income share (%)	10.8	23.3	6.0
Average income per capita (FF 1937 PPP)	2,208	2,485	1,984
Autochthonous poor: Population (%)	74.7	73.1	98.3
Income share (%)	23.4	27.3	90.8
Average income per capita (FF 1937 PPP)	700	694	503
<b>Year 1955</b>			
Europeans: Population share (%)	10.24	8.23	0.36
Income share (%)	46.8	42.9	12.3
Average income per capita (FF 1937 PPP)	11,854	11,487	31,107
Autochthonous non-poor: Pop. (%)	16.3	20.2	10.9
Income share (%)	24.0	30.1	36.0
Average income per capita (FF 1937 PPP)	3,806	3,287	3,029
Autochthonous poor: Population (%)	73.4	71.6	88.8
Income share (%)	29.2	27.1	51.7
Average income per capita (FF 1937 PPP)	1,033	835	533

**Sources:** Social tables from Samir Amin (1966,1971), income tax tabulation data from Alvaredo, Cogneau and Piketty (2020), and urbanization data from various sources (see text). **Notes:** Europeans include Jews in North Africa.

### *Tax rates*

In the settlement colonies of Algeria and Tunisia, the European and Jewish population paid a disproportionate share of the direct taxes; for example in 1955 Tunisia, Europeans represented 74% of income tax payers (78% of taxable income), and the remaining 26% were perhaps overwhelmingly Jews (Alvaredo, Cogneau and Piketty 2020).<sup>6</sup> They also paid quite a lot of the taxes on imported consumer goods, alcoholic drinks in particular. Generally speaking, most of the modernized taxation apparatus applied to a formal sector built around

<sup>6</sup> See also Nicolăi (1962, pp. 447-450).

the settlers' enclave, so that Europeans also paid a large share of turnover taxes and of registration fees.<sup>7</sup> Yet their income share was also very high, always above 40%, and even as high as 66% in 1925 Algeria, according to our estimates (Tables A4.1 and A4.2 above).

In the rest of the colonial empire, where settlers were few, autochthons had to pay the bulk of the tax bill. Though European settlers were richer than their counterparts in North Africa, and much richer than autochthons (Table A4.1), they were not enough to generate large revenue.<sup>8</sup> Before World War II, direct taxation of income was limited.<sup>9</sup> In AOF, the Metropolitan general income tax had been gradually introduced after 1930, and schedular taxes on wages, profits and investment income appeared in 1942 (Doublet 1952, pp.109-112). The "*prestations*" system of forced labor taxation was abolished in 1946. Head tax rates were already different between districts, depending on urbanization and affluence; at the beginning of the 1950s they started to be fixed according to individual occupation or income, hence becoming mildly progressive (Doublet 1952).<sup>10</sup> Yet, the rates were also significantly raised: between 1925 and 1955 the revenue per capita from *capitation* more than doubled in AOF (from 9 to 21 francs in 1937 PPP).

In North Africa like in Sub-Saharan Africa, between 1925 and 1955 the weight of modern taxes in total revenue increased, and the weight of the most archaic tax, *capitation*, decreased (see Table 3 in the main text). Modern taxes being the most progressive and *capitation* the most regressive of all taxes, one could expect that tax systems turned more progressive overall. Yet, the apparent modernization of the tax structure could very well only reflect colonial inequality and/or the structural change of colonial societies. Where Europeans obtained a higher share of income, the share of revenue from modern taxes or from import duties was mechanically higher. Likewise, where or when more autochthons migrated to cities

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<sup>7</sup> For 1956 Tunisia, Nicolaï estimates that indirect taxes paid by Europeans could be more than 50% of total indirect tax revenue (Nicolaï 1962, p. 453).

<sup>8</sup> Even under upper bound assumptions for their contribution (see below), Europeans contribute to only a tiny share of total tax revenue in AOF, both in 1925 (11%) and in 1955 (18%).

<sup>9</sup> In Indochina 1920-1937, Europeans only paid a minimal lump-sum tax on income based on twelve brackets. The land tax weighed disproportionately on autochthons, while trading licenses were shared more or less equally: see Gouv. Gal de l'Indochine, 1931. *Annuaire Statistique de l'Indochine, deuxième volume, 1923-1929*, Hanoi : Imprimerie d'Extrême Orient, pp. 311 (Annam) & 327 (Tonkin). In 1938, a general income tax was introduced, that also extended to rich Chinese and Indochinese.

<sup>10</sup> For instance in 1950 Côte d'Ivoire, four categories of occupations were distinguished, going from high-rank civil servants, large landowners and big traders to unskilled wage earners or petty traders, with head tax rates ranging from 1,000 francs to 4,500 francs. A fifth class gathered the rest of the population above 15 years of age, including all the smallholders and all the women without occupation. The latter class represented more than 97% of the total population of tax payers and paid a *capitation* ranging from 95 to 280 francs, depending on the district of residence (Doublet 1952, pp.71-80). Dahomey, Guinea and Niger had similar schedules, and Togo distinguished taxpayers according to three brackets of income. Despite the discrepancy in rates, the progressivity was attenuated by the fact that even rich men would pay the base rate for their wife or their children above 15 year-old (and actually 0 for schooled teenagers).

and obtained wage jobs, the tax structure looked more modern due to the same composition effect. This is why we need to combine our estimates of population and income shares of the three social groups with the incidence of taxes on each of them, to disentangle actual increases in progressivity from composition effects stemming from structural change.

To estimate the fiscal burden weighing on each of the three groups, we lack the statistical basis (social accounting matrices) and a well-founded general equilibrium model to perform a proper tax incidence analysis. We instead make a couple of simple extreme assumptions to obtain lower and upper bound estimates of tax progressivity.

To obtain lower bound estimates, we make three assumptions regarding the head tax (*capitation*) and forced labor, the taxes that we categorized as “modern”, and the remaining sources of revenue (monopolies, trade taxes, “intermediate” taxes, and other).

(1) Head tax payments are allocated in proportion of the population older than 15. Only the autochthonous poor contribute to forced labor, and we adopt the monetary equivalents proposed by van Waijenburg (2018) for AOF in 1925 (forced labor was abolished in 1946).

(2) The poor pay none of the modern taxes. Europeans and the autochthonous non-poor pay the same percentage of their income in modern taxes.

(3) For all other sources of revenue (monopolies, intermediate internal taxes and trade taxes), the three groups contribute in the same proportion of their income.

All these assumptions understate progressivity. The first one neglects the transition to a less regressive head tax in AOF after World War II. Regarding the second, Europeans must have faced higher rates, given the higher level and the higher formality/visibility of their earnings.<sup>11</sup> As for the third assumption, the propensity to consume imports, goods produced by the formal sector, or monopoly goods (alcohol, sugar, tobacco) likely increased with income. We thus consider that this set of three extreme assumptions provides us with a lower bound of tax progressivity in each year.

Under these lower bound assumptions (1)-(3), Table A4.3 gives the tax rates on the income of each group in 1925 and 1955, as well as two progressivity indicators: the ratio of the after/before tax ratios of autochthons and Europeans, and the ratio of the after/before tax ratios of the autochthonous poor and non-poor — indicators larger than one are the sign of a progressive tax system. The tax system of 1925 Algeria appears mildly progressive, thanks to

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<sup>11</sup> In 1945 Cameroon, some 1,300 Europeans paid the general income tax and schedular taxes on wages and profits, while 10,000 autochthons earning more than 6,000 francs (i.e. around four times the GDP per capita) paid a tax on income with a flat rate of 4%; 1,400,000 other poor autochthons were subject to standard *capitation*. Revenues collected amounted respectively to 37, 2 and 59 million. Our calculations suggest that Europeans paid 6.7% of their income on these taxes, against 1.2% for autochthons. Min. de la France d’Outre-Mer, 1947. *Annuaire Statistique du Cameroun, vol. 1 1938-1945*, Paris : Imprimerie Nationale, pp. 128-129.



the absence of *capitation*, and as the modern taxes exempting the poor already represented 20% of revenue.<sup>12</sup> The tax system of 1925 Tunisia is just neutral: *capitation* still represents 4% of total revenue and modern taxes are not as developed (5% only). Last, the lower bound of progressivity in 1925 AOF is below 1, indicating a regressive tax system, given the weight of *capitation* and forced labor (41% of total revenue) and the absence of progressive modern taxes.

Table A4.3 — Lower bound estimates of progressivity

	Algeria	Tunisia	AOF
<b>Year 1925</b>			
Estimated tax rates on income (%):			
Europeans	6.6	6.9	4.7
autochthons	5.5	7.1	7.9
autochthonous non-poor	6.6	7.1	5.1
autochthonous poor	5.0	7.2	8.1
Progressivity indicators (ratios):			
autochthons vs Europeans	1.01	1.00	0.97
poor vs non-poor	1.02	1.00	0.97
<b>Year 1955</b>			
Estimated tax rates on income (%):			
Europeans	20.1	22.0	13.7
autochthons	14.6	17.9	14.6
autochthonous non-poor	20.1	22.0	14.4
autochthonous poor	10.1	13.4	14.7
Progressivity indicators (ratios):			
autochthons vs Europeans	1.07	1.05	0.99
poor vs non-poor	1.13	1.11	1.00

**Notes:** Europeans include Jews in NA. The first progressivity indicator is  $(1-t_a)/(1-t_e)$ , where  $t_a$  is the average tax rate on autochthons (second line of each panel), and  $t_e$  the tax rate on Europeans (first line). The second progressivity indicator is  $(1-t_p)/(1-t_{np})$ , where  $t_p$  is the tax rate on the autochthonous poor (fourth line) and  $t_{np}$  the tax rate on the autochthonous non-poor (third line). **Sources:** See text.

Under the same lower bound assumptions, the year 1955 looks more progressive in the three colonies, yet it is in AOF that the change appears the least pronounced. In Algeria the weight of modern taxes reached 41% of total revenue in 1955. In Tunisia, *capitation* had disappeared and modern taxes weighed 32%. In these two countries, according to our estimates the income share of those paying modern taxes (Europeans and the autochthonous non-poor), if anything, decreased slightly (Table A4.2), so that the apparent modernization of the tax system reflected a true increase in progressivity. Indeed, under our assumption, the

<sup>12</sup> For Algeria, Ageron (1990, p. 66) estimates that Europeans paid 53% of the total tax bill before World War I and 73% after the suppression of “Arab taxes” in 1919 and the introduction of the income tax. Although he does not explain his method, his figure is close the one corresponding too our lower bound for 1925 (70%).

modern tax rates on the income of the two non-poor groups increase from 1.6 to 10.0% in Algeria, and from 0.5 to 8.7% in Tunisia. In AOF, thanks in particular to the abolition of forced labor, the share of archaic taxes (*capitation* and *corvée* labor) drops from 41 to 16%; in parallel, the share of modern taxes goes from 0 to 10%. Yet, our estimate of the income share of the non-poor jumps from 9 to 48%, and this boom of the tax base probably explains most of the modernization of the tax structure.<sup>13</sup> According to our estimates, modern tax rates on the non-poor (Europeans and autochthons) rose from 0.1 to 3.0% only, while the archaic tax rate on the poor also increased from 3.5 to 4%; recall however that under assumption (1) the reforms of *capitation*, making it less regressive, are not taken into account here.

In Algeria and Tunisia, the tax system of 1955 is unambiguously progressive between our three groups, primarily along the poor/non-poor line among autochthons (the progressivity indicator reaching 1.13 in Algeria, and 1.11 in Tunisia), and secondarily along the racial line (1.07 and 1.05 in Tunisia). In AOF, under lower bounds assumptions it reaches neutrality; in contrast with 1925, we can at least exclude that it was regressive.

Can we robustly conclude that progressivity unambiguously increased between 1925 and 1955? The main concern is our assumption (3) that the three groups contributed in the same proportion of their income to all sources of revenue other than the head tax and modern taxes. In fact, this could have changed between 1925 and 1955 as the autochthons, especially the non-poor, became more involved in the formal economy, as tax enforcement improved, and as consumption patterns changed towards more imported goods or monopoly goods. To have a significant impact on our estimates of progressivity dynamics, these evolutions should affect taxes other than modern taxes, as modern taxes were not very developed in 1925 (see above).

We alternatively compute a much more progressive estimate of the distribution of taxes by replacing assumptions (1) to (3) by the following ones:

(1') Europeans' average head tax rate (per capita) is twice the non-poor's, and ten times the poor's (only for 1955);

(2') Europeans face a modern tax rate (on income) that is twice the non-poor's;

(3') Half of the revenue from other taxes is only collected on the non-poor (Europeans and autochthons), like modern taxes, with the same tax rate (on income) for the two groups.

We believe this alternative set of assumptions provides us with an upper bound of tax progressivity. Of course, a more extreme upper bound would have all taxes except *capitation*

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<sup>13</sup> The income share of Europeans increases from 3 to 12%, and the share of non-poor autochthons from 6 to 36%.

paid by the non-poor (or even by the Europeans only). Yet such an extreme assumption generates tax rates on the non-poor groups as high as 50% in 1925 AOF, which seems quite unrealistic.

Table A4.4 reports the results of the numerical simulations under assumptions (1')-(3').

Table A4.4 — Upper bound estimates of progressivity

	Algeria	Tunisia	AOF
<b>Year 1925</b>			
Estimated tax rates on income (%):			
Europeans	7.5	8.2	27.1
autochthons	3.8	5.9	7.1
autochthonous non-poor	6.6	8.1	27.5
autochthonous poor	2.5	4.0	5.8
Progressivity indicators (ratios):			
autochthons vs Europeans	1.04	1.04	1.27
poor vs non-poor	1.04	1.03	1.30
<b>Year 1955</b>			
Estimated tax rates on income (%):			
Europeans	24.3	26.7	21.7
autochthons	11.0	14.4	13.4
autochthonous non-poor	18.3	21.2	21.2
autochthonous poor	5.1	6.8	8.1
Progressivity indicators (ratios):			
autochthons vs Europeans	1.18	1.17	1.11
poor vs non-poor	1.16	1.18	1.17

**Notes:** See Table A4.3. **Sources:** See text.

To obtain a lower bound for the *evolution* of progressivity between 1925 and 1955, we can compare the upper bound of progressivity for 1925 from Table A4.4 top panel with the lower bound for 1955 from Table A4.3 bottom panel. In Algeria and Tunisia, the progressivity indicator still increases, from 1.04 to 1.05-1.07 along racial lines and from 1.03-1.04 to 1.11-1.13 along the poor/non-poor line among autochthons. Along the racial line, the conclusion of an increase in progressivity even survives assuming a zero tax rate on the poor in 1925, i.e. a very extreme version of assumption (3').

In AOF, the same comparison indicates a large decrease in progressivity, while the reverse one (lower bound of 1925 to upper bound of 1955) points to a large increase. It is therefore impossible to draw any robust conclusion. Similarly, when we try to compare AOF with the two North African colonies, the “confidence interval” for AOF encompasses the one for Algeria or Tunisia in 1925, and they overlap over a large range in 1955. Though the importance of the head tax and the underdevelopment of modern taxes make it likely that the

tax system in AOF was more regressive than in North Africa, this conclusion hinges on the fact that other taxes were not more progressive in AOF, which is not granted.<sup>14</sup>

A second uncertainty and concern is that the income share of the autochthonous non-poor in 1925 was extrapolated under a strong assumption. We also explored the sensitivity of our comparisons to this parameter. In Algeria and Tunisia, halving this income share, that is assuming that the tax base of modern taxes was narrower, barely increases progressivity in 1925 because modern taxation was still limited. Our conclusion of a progressivity increase again survives.<sup>15</sup> In AOF, halving or doubling the income share does not reduce ambiguity.

We conclude that despite the uncertainties attached to the income distribution and to the sharing of the tax burden in each year and especially in 1925, it is likely that tax progressivity increased in Algeria and Tunisia, even if the improvement was perhaps modest. Further, our lower bound estimates make it implausible that the colonial tax system was purely regressive along racial lines, even in 1925, yet its progressivity could also have been very limited. In the case of AOF, the importance of *capitation* and forced labor means it is possible the tax system was regressive in 1925, but the confidence intervals are too large to draw any robust conclusion on progressivity comparisons, across time or across space.

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<sup>14</sup> Regarding assumption (2') compared to (2), it might seem quite unlikely that modern taxes turned less progressive between 1925 and 1955. We checked that keeping the same assumption (either 2 or 2') in both years did not modify our conclusions. This mechanically reinforces our conclusion on the improvement of progressivity in North Africa, and leaves the ambiguity in AOF unchanged.

<sup>15</sup> The upper bounds of progressivity indicators for 1925 are then 1.05/1.05 instead of 1.04/1.04 in Algeria, and 1.05/1.06 in Tunisia.