Millet production & agricultural income in colonial Senegal

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Statistics for groundnut exports in Senegal are comprehensive and have been collected by other authors (most comprehensively in Vanhaeverbeke 1970). Reliable figures on domestic millet production are more or less non-existent except for the last decade or so of colonial rule. However, it is important to make some attempt at estimating millet output because the cash crop boom in Senegal was not, as we have seen, a case of pure vent-for-surplus. More land was brought under cultivation as the international demand for groundnuts grew, but some land that had previously been devoted to millet was given over to groundnuts, with Indochinese rice imports making up the caloric deficit. In addition to the usual annual fluctuations of the weather, the individual decision of each farming household as to how much land they would devote to each crop mattered for their income.

In brief, I use a demand function to estimate the demand for food in Senegal:

$$d_f = Y^{\alpha} \cdot P_f^{\beta} \cdot P_n^{\gamma}$$

where d denotes demand, Y income (proxied here by the real urban wage), P price, and f and n represent food and non-food products respectively. The price indices are both deflated by the overall Dakar price index. The Greek exponents give the relevant elasticities. In other words, food demand is a function of income, the price of food, and the price of all other products. The Slutsky-Schulz condition requires that direct, crossed and income elasticities must sum to zero:

$$\alpha + \beta + \gamma = 0$$

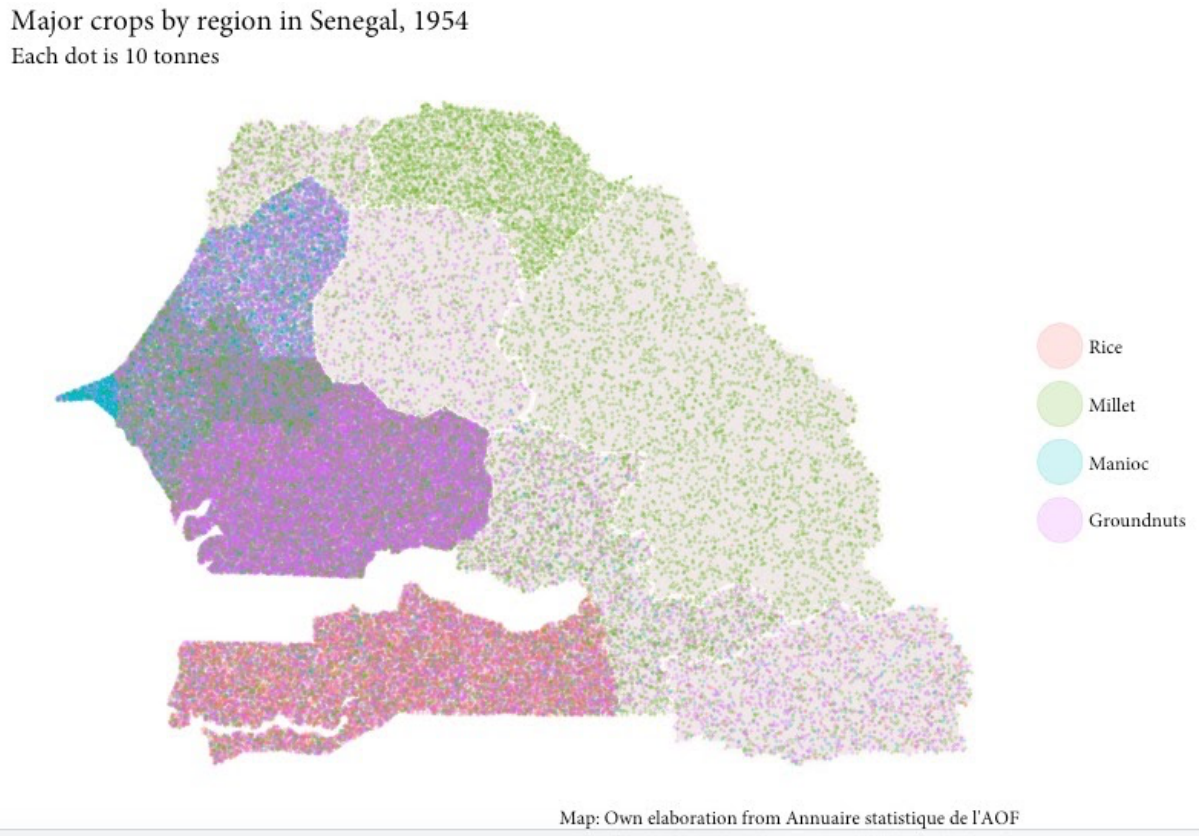
thereby constraining our possible exponent choices. I have chosen $\alpha = 0.3, \beta = -0.4, \gamma = 0.1$, which are fairly standard values in the historical accounting literature. Using indices of the real wage, the real price of food and the real price of non-food products, I then derive a series for food demand.

This demand-side approach is, so far, fairly standard (Malanima, 2011). However, it relies on an assumption that is thoroughly unrealistic for most cash-crop economies: that food trade is balanced. In colonial Senegal, millet and groundnuts were grown domestically, and rice was imported, largely from French Indochina. Ignoring for a moment the possibility of a rise in per hectare land productivity, increased groundnut production could come either from a decline in millet acreage (in which case we would expect rice imports to rise to meet food demand) or from an expansion in total hectares

cultivated, in which case either millet production or rice imports might rise to meet the rise in income. For this reason, in estimating millet production, I assume that food demand is met partially by imported rice, the volume of which I can measure, and by millet production, the residual.

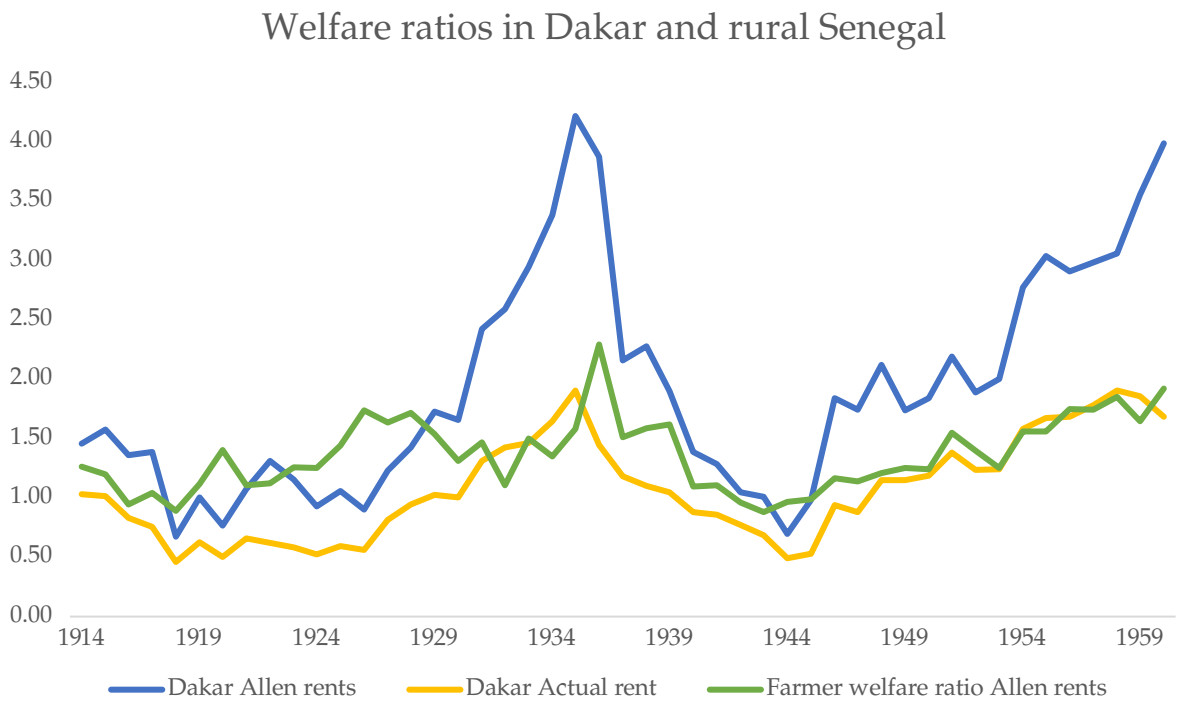
Taking 1954, a year for which both millet production and rice imports are fairly well-documented, I then convert the food demand index into an estimate for rice-equivalent units, taking into account the fact that millet has about 83% of the calories per unit of weight than does rice. I also account for the fact that there was substantial production of secondary crops, like cassava (approximately 80,000 tonnes in 1954) and Casamançais rice (approximately 63,000 tonnes). In total, in 1954, millet made up about 66% of total domestic food production, expressed in rice-equivalent units, and about 61% of total domestic food production by value. I therefore subtract rice imports from total food demand to arrive at total domestic food supply, and multiply this by 0.66 to arrive at total millet production.

I then divide millet production by the total non-urban population, further dividing by four to arrive at the equivalent of Allen's two-adult, two-children family. This gives average household millet production. I perform the same operation for groundnut exports, to arrive at figures for total household production in each year. I multiply these volumes by yearly prices, taken from my urban millet price series and Vanhaeverbeke's groundnut FOB price series, the latter adjusted for marketing margins. This gives us income from millet and income; however, since 61% of total domestic food production by value came from non-millet crops like rice and cassava, I divide total income by 0.61 to arrive at a figure for total household agricultural production in current francs. I divide this figure by the Dakar price index to yield an estimate for farmer income. The resulting series probably does not describe any one family particularly well. Crop mixes varied greatly across different regions in Senegal (see Map 1).



Map 1

The resulting series is, however, extremely telling. Farmer welfare ratios, shown as the grey line in the following figure, closely track the Dakar series that uses estimated working class rents rather than Allen-style 5%-of-subsistence-basket rents. (The 'Allen-style' rent series, on the other hand, is much higher, suggesting that the much of the extra-subsistence surplus in Dakar was claimed by urban landlords, rather than urban workers). The relationship between rural and urban incomes is very striking in the 1940s and 1950s, where the series are almost identical, suggesting that wage-setting in Dakar was highly responsive to conditions in the rural hinterland. Incomes were higher in rural Senegal than in Dakar in the first third of the twentieth century.


Welfare ratios in Dakar and rural Senegal
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1914
1919
1924
1929
1934
1939
1944
1949
1954
1959
Dakar Allen rents
Dakar Actual rent
Farmer welfare ratio Allen rents