DEBATES

Portuguese Economic Growth, 1833-1985: Some Doubts

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Indirect methods for measuring national income or output have been of considerable interest for quite some time, both to students of Third World countries, where statistics gathering is often not very advanced, and to historians seeking to reconstruct the long-run growth of countries for which direct evidence is not abundant. In the second of these categories, Portugal is one of the last European countries for which no series of national output data stretching back into the nineteenth century has been available. The article recently published by Anabela Nunes, Eugénia Mata and Nuno Valério (hereafter NUMAVA) in this *Journal* is therefore not only a welcome addition to the general literature on the subject but also a breakthrough in terms of Portuguese quantitative economic history.[1]

In view of the dearth of good historical statistics for Portugal, it is hardly surprising that they should have opted for an indirect approach in calculating values for GDP over the period 1833-1985. The methodology employed is that pioneered in earlier papers by Valério (1983) and later by Justino (1987), with GDP being estimated by means of a weighted average of proxy variables taken from the foreign trade and government sectors, exports, fiscal receipts and public expenditure.[2] But while in the two earlier studies, the weights we-

[1] "Portuguese Economic Growth, 1883-1985", this *Journal*, vol. 18, n. 2, Fall 1989, pp. 291-330.

[2] It is not, however, the first time it is used in Portugal for the reconstruction of historical macro-aggregates. VASCO FARIA and ANIBAL SANTOS employed it to estimate gross fixed capital formation for 1927-1974 in their *O Capital Fixo na Indústria Transformadora Portuguesa, 1947-1974* (Lisboa, GEBEI, 1977), pp. 50-60.

re derived using the principal components method, this time, more realistically, they are the extrapolated income elasticities of each one of the proxy variables, computed over the period 1947-1985, the only one for which a reliable series for GDP exists.

Although a quick and ingenious way of circumventing some of the more formidable barriers to a direct estimation of macroeconomic variables, unfortunately, as in all good pioneering efforts, this one raises almost as many problems as it solves. As a consequence, it is arguable whether we are left much the wiser concerning the pattern of Portugal's long-run economic growth.

Of the two sets of doubts we think this article raises, the first has to do with the economic reasoning which underlies the entire exercise and which runs counter to generally accepted views on the nature of economic development. An assumption which is crucial for the method used by NUMAVA is that of a constant relation, over 150 years, between gross domestic product, on the one hand, and fiscal receipts, public expenditure and exports, on the other (p. 312). Common sense and even the most cursory examination of the records of other western economies during the same years suggest that this is a shaky foundation on which to build and that historically such structural stability is at the very least remarkable, considering that this was a period of rapid and profound change. Just to take the export performance of the seven countries studied by Paul Bairoch during the second half of the nineteenth century as an example, in several of them the share of exports in GNP varied by as much as 100% during this period, which defeats any notion of a constant income elasticity for this variable.[3] In fact, NUMAVA recognize the problem, given that they reject one possible proxy variable — money — precisely on the grounds that "there was a change in the behaviour of economic units towards [it]" (p. 312). They do not, however, contemplate the possibility that this might have applied to the others proxies too, an omission which needs some justification.

Since it is impossible, in the present state of knowledge, to verify by independent means whether or not such structural stability existed in Portugal, the next best procedure is to see if this assumption holds true for other economies over a similar time span. The procedure consists first of all in applying the method used by NUMAVA to countries for which reliable GDP statistics have been estimated directly using production data. The results of the log-linear regression of the proxy variables on GDP for the years 1947-

[3] Paul Bairoch, *Commerce Exterieure et Developpement Economique de l'Europe au XIXe Siecle* (Paris, Mouton, 1976), p. 79. A similar variability in the relation between public expenditure and GDP is shown to exist for a number of European countries by Pedro Tedde de Lorca, in "El Gasto Publico en España, 1875-1906: Un Analisis Comparativo con las Economias Europeas" in Pablo Martin Aceña and Leandro Prados de la Escosura (eds.) *La Nueva Historica Economica en España* (Madrid, Tecnos, 1983), p. 248.

1985 are presented in table 1. They show that the three-variable model does not apply to the majority of the cases — of the ten countries considered, besides Portugal only three others had three or more statistically significant coefficients. The structural consistency we are looking for, therefore, cannot be clearly established on a European basis, even for this much shorter period.

In the second place, to find out if the relationship still holds over a much longer run and therefore has some heuristic power, the next step was to make extrapolations backwards from 1947 for the three countries in our sample which showed the best results in table 1. This was done by substituting the values of the independent variables in the regressions in table 1. The resulting estimates for GDP enabled us to construct table 2, which shows the margins of error of these estimates compared to those obtained by direct methods. In table 3, the same information is used to compare the rates of growth of GDP over shorter periods as computed by each of the two mothods.

The main conclusion to be drawn from all this in favour of the NUMAVA approach is that in the long run the margin of error is small. One can therefore place a reasonable amount of confidence in the estimated rate of growth of Portugal's GDP for periods of a hundred years or so, using this method. As soon as one breaks up the time span into shorter units, however, the reliability of this procedure as a predictor weakens appreciably. For the 15-year periods shown in table 3, rates of growth are often out by more than one percentage point, which in some instances of slower growth means an error of 1/3 to 1/2. Even for longer periods, the discrepancies can be fairly large and it should be remembered, in this connection, that a 0.5% difference in a compound rate of growth for 40 years becomes a 22% difference in absolute levels and 1% becomes 49%. Another distortion is that periods of quickening growth can get shown as periods of slowing down and vice-versa. (e.g. Sweden 1885 - 1900 or Finland 1900-1913). The procedure may, therefore, invert the true direction of the time trend and yet it offers a no obvious way of detecting that this is happening. Finally, in terms of accuracy, the XIXth century fares less well than the XXth, which is not surprising given that the assumption of structural stability is likely to hold less and less as one retreats into the past. In fact, it should be noted that prior to 1914, the NUMAVA method systematically overestimates GDP, somethings which obviously relates to the use of fixed coefficients for fiscal receipts and government expenditure which were calculated for a period when the State's role in the economy was much more important.

[4] The econometrics of the NUMAVA model is not reviewed here. It should be said, however, that the model is apparently affected by collinearity, especially if the balance of trade and the government deficit do not vary much over time. The statistical coherence of the model would be improved by using only two variables, one from each sector.

Table 1
REGRESSION RESULTS (1947-1985)

	Coefficients					Statistics				
	C	LX	LM	LFR	LPE	R2	DW	SER	Q	F
Belgium	2.293	.167	.166	.327	.157	.999	1.49	.017	8.98	6491
	(35.2)	(1.56)	(1.66)	(2.34)	(1.64)	—	—	—	—	—
Denmark	3.521	(*)	.322	.215	.249	.999	1.99	.039	7.79	7538
	(9.72)	—	(4.21)	(1.70)	(1.97)	—	—	—	—	—
Finland	2.456	.174	.206	.171	.333	.999	2.67	.033	10.80	11592
	(8.80)	(2.71)	(3.34)	(3.19)	(4.94)	—	—	—	—	—
France	5.859	.118	.180	.121	.004	.999	1.66	.037	10.48	6707
	(5.30)	(1.22)	(2.23)	(0.93)	(0.04)	—	—	—	—	—
Italy	2.006	.016	.388	.354	.126	.999	1.49	.045	16.13	7586
	(51.3)	(0.96)	(6.93)	(2.72)	(1.21)	—	—	—	—	—
Norway	2.727	.301	.152	.400	−.400	.997	2.13	.035	6.68	1676
	(4.14)	(2.26)	(0.87)	(2.10)	(0.02)	—	—	—	—	—
Portugal	3.507	.146	(*)	.409	.292	1.00	1.88	.022	6.67	35309
	(75.9)	(4.82)	—	(5.70)	(5.21)	—	—	—	—	—
Spain	3.400	.015	−.008	.425	.319	.998	1.83	.082	14.47	2987
	(10.5)	(0.18)	(0.09)	(1.33)	(1.01)	—	—	—	—	—
Sweden	3.397	.353	(*)	.225	.237	.999	1.87	.033	11.46	9223
	(30.7)	(7.21)	—	(3.95)	(3.31)	—	—	—	—	—
U.K.	2.777	.334	−.123	.048	.422	.999	1.39	.029	17.38	9533
	(2.92)	(3.60)	(1.85)	(0.32)	(3.72)	—	—	—	—	—

Notes:

LY, LX, LM, LFR, LPE are respectively the natural logarithms of GDP, Exports Imports, Fiscal Revenue and Public Expenditure, at current prices. C is the intercept.

For Belgium and Norway the samples are respectively 1953-1978 and 1950-1976.

Positive values for the t-statistics are given in brackets. Serial correlation of the first order has been corrected by using the Cochrane-Orcutt method. The Box-Price test for stationariness is positive at the 5% significance level if the Q-statistics are smaller than 12,44 (Chi-square value with 20 degrees of freedom).

(*) Following NUMAVA, when one independent variable was statistically non-significant, it was dropped and the regression rerun with the remaining three variables. All the parameters of the regressions which fit well (Denmark, Finland, Sweden and Portugal) are statistically significant at 5%, except for LFR for Denmark which was significant at 10%.

Sources: till 1959, Mitchell (1975) and, for Portugal, Nunes et al. (1989); IMF International Statistics thereafter.

Table 2
NUMAVA GDP ESTIMATES
Compared Margins of Error (*)

	Denmark	Finland	Sweden
1865	na	na	1.08
1870	1.42	na	1.14
1885	1.49	1.57	1.19
1900	1.31	1.53	1.08
1913	1.44	1.77	1.03
1935	0.89	1.41	0.93
1950	0.93	1.22	0.97
1970	1.10	0.97	1.00
1984	0.94	0.97	1.03

(*) Ratios of the values given by NUMAVA to those of historical national accounts of each country (three-year averages centred on the years in the table). NUMAVA is the series computed by the method in Nunes et al. (1989).
Sources: as in table 1.

Table 3
ANNUAL GDP GROWTH RATES
(current prices)

Period	Denmark		Finland		Sweden	
	NUMAYA	N. acc.	NUMAYA	N. acc.	NUMAYA	N. acc.
1870-1885	1.8	1.5	na	1.7	2.8	2.5
1885-1900	2.2	3.1	4.1	4.4	2.7	3.4
1900-1913	3.5	4.6	5.2	4.0	4.1	4.6
1913-1935	3.5	4.7	12.6	13.8	3.8	4.2
1935-1950	8.7	8.4	21.2	22.3	9.2	8.9
1950-1970	9.9	9.0	9.6	10.8	8.4	8.2
1970-1984	10.5	11.8	14.5	14.5	11.8	11.5
1870-1913	2.4	3.0	na	3.3	3.2	3.4
1885-1913	2.8	3.8	4.6	4.2	3.4	3.9
1913-1950	5.6	6.2	16.0	17.2	5.9	6.1
1950-1984	10.1	10.1	11.0	12.3	9.8	9.6
1885-1984	6.3	6.8	11.2	11.7	6.5	6.7

Note: "NUMAVA" refers to the series computed by the method in NUNES et al. (1989).
Sources: as in Table 1.

No exercise in the field of retrospective national accounting is free from errors and some of these can be quite substantial.[5] The question which has to be asked every time, however, is of what magnitude is the uncertainty and is this acceptable to the historian? If Portugal is at all like some of examples given here, then the errors could be serious and the method of extrapolation would lose a lot of its attraction and usefulness. Indeed, in the case of both Denmark and Finland, the errors of estimation exceed by far and for a lot of the time the margins which NUMAVA themselves found and thought acceptable for their own estimation, i.e. a band of − 11% to + 17%.[6] On the other hand, the evidence presented thus far does not conclusively rule out that for some reason this method, when applied to Portugal, should have fit exceptionally well and, contrary to other countries, produced unusually accurate estimates. This brings us to our second set of doubts, which relates to the incongruence between NUMAVA's findings and the sectoral results produced in recent years by other researchers working directly from available historical output data and not by extrapolation.

An important criterion for the reliability of an extrapolated index is whether it coheres with quantitative information, particularly of a sectoral nature which has been derived using different means and from other sources. From this point of view, it cannot be said that the picture of the XIXth century drawn by NUMAVA on the basis of their findings fares particularly well.[7] According to them the Portuguese growth process from the 1850s to 1914 may be divided into two contrasting periods: one of fairly rapid expansion from 1860 to 1890 (2.8% per annum in real terms); and the other from then until the First World War, a time of "near stagnation" (0.9% per annum). Since they also recognize that up to 1890 industrial output must have increased at a yearly rate of 2.5 - 3.0%, this leads them to suppose that "agricultural growth must have been at least similar to ensure the overall performance in the same range given by our estimates" (p. 300). This is contradicted, however, by recent research on Portuguese agriculture which shows that during these years this sector only managed a growth rate of the order of 1.3% a

[5] For a recent example, see Olle Krantz, "New Estimates of Swedish Historical GDP since the Beginning of the Nineteenth Century", *Review of Income and Wealth*, series 34, n. 2 (1988), pp. 165-181.

[6] NUMAVA (p. 319) assumes as error margins the maximum and minimum ratios of the outcome of the complete multiple linear regression presented in the text to the outcome of simple linear regression of each of the proxy variables. It is not clear how these margins were calculated for the period 1833-1850, for which there is information for only one dependent variable (public expenditure). Apart from that, it should be noted that this is really a test of the internal consistency of the model and not, as claimed, of the validity of the resulting estimates.

[7] We shall deal here only with the period starting in the 1850s. Prior to this the NUMAVA index is based solely on public expenditure, a particularly problematic proxy, and is therefore highly unreliable, as they are the first to recognize.

year (Lains, 1990). Under the circumstances, unless one assumes an inordinately high and unlikely expansion of the service sector, one should conclude that GDP must have a good deal slower than NUMAVA thought, and probably at a rate closer to half the figure they estimated.

The same analysis for the succeeding period, considered by NUMAVA as a "not very typical *belle epoque*", reveals again the inconsistency between their view of the economy's growth path and what we know of how the primary and secondary sectors fared. With industry growing at around 2.5% a year (Reis, 1986), agriculture would have had to show no increase at all, for their estimate to be correct (p. 301). In fact, agriculture did slow down but not to such a great extent. The index compiled by Lains directly from production data shows it had been expanding at a rate of 0.6%, with a sharp rise up to 1903 and a contraction thereafter (Lains, 1990).[8] If correct, the latter would imply, for the economy as a whole, a rate in the region of 1.3% and therefore an upward correction of nearly 50%.

The alternative view which thus emerges for the second half of the XIXth century is rather different from that inspired by the NUMAVA results. Instead of a sharp contrast between the pre-and post-1890 periods, the economy appears to have performed in a far more even way, both in global and in sectoral terms. While it is true that there was a slowing down after 1890, the rate of growth did not fall steeply. Of particular significance, this could mean, in turn, that there continues to be a need for a fresh, revisionist look at the traditional interpretation espoused by them, which tends to portray the financial and political crisis of the early 1890s as a great watershed in the history of Portugal.

Since wartime periods are notoriously difficult when it comes to quantifying economic activity, it is perhaps not surprising that still more serious difficulties are encountered when we carry out the same exercise for the various cycles which make up the years from 1914 to 1947. The first of these has to do with the apparently catastrophic impact of the First World War on the Portuguese economy, which according to NUMAVA suffered a real decline in per capita income of 40% and a negative rate of growth for GDP of − 6.4% per annum between 1914 and 1921! This virtual collapse, which they describe merely as a "setback", has no parallel in the Western world of the time, with the possible exception of post-1917 Russia, and it is hard to imagine how the fabric of society and the institutional framework of the country could have survived such a crisis, as they did, in spite of the turbulence which was characteristic of that era. In fact, the worst performers during these years were the main belligerents and they did nowhere as badly as this (France: − 2.2%; Germany: −1.6%; UK: −1.6%) (Maddison, 1982). At the time, se-

[8] Contrary to what NUMAVA state (p. 301), far from slowing down agriculture, the protectionist measures of 1889 and 1899 fostered its growth, as they were intended to do (Reis, 1979).

veral countries, mostly those which, like Portugal, were relatively peripheral to the war effort, actually showed positive rates of growth. Consequently, to be credible the sharp decline attributed to Portugal requires a very special explanation as to why this economy should have been such an outlier.

The explanation given by NUMAVA is simply the shortage of external supplies of vital commodities (fuel and certain foodstuffs), the inability of industry to respond to rising demand abroad and a certain measure of financial disruption (p. 302), all of which were problems besetting the whole of Europe and by no means peculiar to Portugal. Of course, it cannot be denied that the Portuguese economy suffered adversity during the years 1914-1921, for these as well as for other reasons. On the other hand, bearing in mind that prior to 1914 this was one of the least open economies of Europe, one should be sceptical of any interpretation which relies so much on external influences.

In any case, a look at the available evidence, poor as it is in quality, hardly suggests such a debacle. As regards industry, some raw material imports were indeed hard hit, the most obvious being imports of coal (48% in 1920, compared to the average for 1909-1913), iron (47%) and cotton (21%). On the other hand, imports of steel and non-ferrous metals hardly declined and although wool imports fell by 70%, this was replaced by domestic sources, exports of which almost ceased. Even the scarcity of coal and iron may not have been as grievous as the foreign trade statistics suggest, given the possibility of their substitution respectively by firewood and scrap, as happened everywhere throughout the continent. The cotton industry was probably the worst off but it should be remembered that although one of the most important manufacturing sectors in peace time, in 1913 it still only accounted for a tiny fraction of GDP (Moura, 1957). As for industrial exports, the figures hardly bear out the negative view given by NUMAVA. Canned fish exports, by volume, rose 50% (1920 compared to 1909-1913), cork declined slightly (5%) and chemical fertilizer boomed, with an increase of 2,000%, admittedly coming from a very low base figure.

A dramatic contraction is not to be detected in agriculture either. A report prepared in 1920 for the Peace Conference Executive Committee refers to wartime difficulties but it is clear that, as in manufacturing, although overall there may have been some reduction in output, the experience was a mixed one, with some sectors moving ahead and others contracting (Gomes, 1920). Published production statistics for this period are unreliable because farmers witheld information, owing to government attempts to control food supplies. As this means that they probably underestimated output, it is instructive that production of the three principal grains — wheat, maize and rye — was down only 20% on prewar levels, while wine and olive oil showed no decline and lesser crops such as rice, chickpeas, barley and oats exhibited an upward trend, during the war and up to 1921.

The second war-time experience of Portugal in the XXth century, this time as a non-belligerent, was a much less negative one. According to NUMA-

VA's estimates, GDP fell by only 5% over the period 1939-1945 but again, their account seems to be substantially at variance with available sectoral data on production, all of which point to a moderate expansion of the economy instead. The industrial output index compiled by Pereira de Moura more than 30 years ago and still not superseded indicates a growth in manufacturing of 20% for the period 1940-1945 (Moura, 1957). For the economy as a whole to have contracted would have required therefore a still greater contraction of the agricultural sector. Official data, however, show just the opposite, with an annual rate of growth of 1.9% for the period 1938-1947 (*O Rendimento Nacional Português*, 1959). The same source provides us, in fact, with the first official effort at national account construction in Portugal. According to this, the same period was unmistakeably one of economy expansion, at a rate of 2.9% a year, in real terms. Unless one is prepared to claim that all of this increase took place in 1938/9 and 1945/7, we are left to conclude that the most likely evolution is not that described by NUMAVA but rather that "the war constituted a period of global prosperity for the Portuguese economy" (Rosas, 1990).

The corollary to amending the picture they draw in accordance with the foregoing remarks is that their findings for the inter-war period must be revised too. Taking as true their 1947 figure for GDP at 1914 prices, that for 1938 would have to be brought down to 1414, instead of 1634. At the other end of this period and assuming that, in keeping with what happened to the other small countries of Europe, the Portuguese economy stagnated during 1914-1921, then the index number for GDP in 1921 would be 862, i.e. the same as in 1914. The next two decades (1921-1938) would thus have registered a rate of growth of 3.0%. This is not only still respectable but also more likely than NUMAVA's implausibly high rate of 6.6%, which if correct, would represent, by European standards, yet another inexplicable record for Portugal.

But is this alternative performance any more credible, in the light of what the available sectoral indicators tell us? Unfortunately, the work of reconstructing agricultural and industrial production indices for the interwar period has yet to be carried out and we have therefore to look at less robust evidence. For agriculture, it seems unlikely that its gross output should have exceeded the real annual growth rate of 2.4% which we have calculated only on the basis of arable production.[9] A result such as this would imply an expansion of industry at something like 4.1% per annum whereas the rate implicit in NUMAVA' GDP would be 9.1%.[10]

[9] This rough calculation of ours was carried out on the basis of production and price statistics taken from Gomes et al., 1945. Stocks of cattle do not seem to have grown much (+ 5%) between 1925 and 1940 and we can assume therefore a zero growth rate for animal products during the interwar period.

[10] This was estimated using the sectoral proportions given in *O Rendimento Nacional Português*, 1959.

Table 4
INDEX OF INDUSTRIAL OUTPUT, 1920-1939

1920	57
1921	59
1922	74
1923	80
1924	74
1925	67
1926	79
1927	95
1928	87
1929	100
1930	122
1931	114
1932	133
1933	118
1934	124
1935	143
1936	128
1937	164
1938	146
1939	132

Sources: see footnote 11.

For an independent check on which of the two figures is the most plausible, we have carried out a rough estimate of an index of industrial output for the inter-war years. The results are given in table 4 which shows an annual rate of growth of 5.1%.[11] Naturally, some "new" sectors such as paper, chemical fertilizers and rubber did very well and even a more "traditional" sector like cotton expanded quite rapidly. On the other hand, tobacco, woollens, cork and canned fish were slow performers. Altogether, the picture of Portuguese industry during these years is a coherent one and even allowing for considerable imperfections, the indicator we have thus put together seems

[11] The index was constructed according to the methodology used in Reis (1986) and Lains (1990). It covers cotton, woollens, cork, canned fish, rubber, paper, beer, tobacco, iron and steel goods and fertilizer. Data for raw material imports and for exports of manufactures were taken from the trade statistics of Portugal. Fertilizer production was given by the national statistical year book. Sectoral indices at constant prices were aggregated using the weights in Moura et al., 1957. The somewhat different weights found in Chaves, 1959 were also tried but results were roughly the same.

to provide clear evidence that nothing like the inter-war industrial performance implied by NUMAVA is at all likely. In fact, only two of the significant manufacturing sectors of this period — fertilizers and cement — showed such high growth rates, all others, not surprisingly, doing far less well.

To conclude, the NUMAVA estimates for Portuguese GDP since 1833, although challenging and interesting, seem reliable only for the very long run and can only serve as a very rough guide for the performance of the economy. They suffer from two shortcomings. In the first place, while they are too unreliable for anything like a short or medium term analysis, their year to year fluctuations are too violent to render them of use for interannual comparisons. For the economic historian, their second disavantage lies in the fact they cannot be employed in any quantitative analysis of what are some of the more interesting problems of XIXth and XXth century development. Given the manner of the estimation, it is impossible to use them to study the role of foreign trade and/or of the State in economic growth without the risk of circularity. Whilst recognizing the importance of this contribution to the ongoing debate concerning Portugal's economic performance over the last 150 years, we find it hard to agree that "we have got more accurate figures now" (p. 296).

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