

Portuguese Economic Growth *1833-1985*

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Introduction

The time has come for a thorough revision of the existing knowledge about Portuguese economic growth in the XIXth and XXth centuries. Several texts published in the 1980's have provided a lot of data and much seminal discussion. However, retrospective national accounts estimates and conflicting theses have flourished in a rather chaotic way, and an attempt at synthesis may be welcome for future debate.

This paper tries to provide such a synthesis. Its first part presents new estimates of gross domestic product, which extend the quantitative basis and the time-span of previous estimates. Its second part discusses the conclusions that can be drawn from the estimates presented in the first part, and the perspectives they open for research on Portuguese economic history of the XIXth and XXth centuries.

1. A quantitative appraisal of Portuguese economic growth

A - Estimates

Time series of gross domestic product at market current prices, of its deflator, of gross domestic product at 1914 market prices, of population, and of per capita gross domestic product

at market 1914 prices, are presented in the following table. The methodology and sources of the estimates are presented in the appendix.

Table 1
PORTUGUESE ECONOMIC GROWTH: ESTIMATES

| Year | Gross domestic product market current prices | Price index 1914 | Gross domestic product market 1914 prices | Population | Per capita gross domestic product 1914 prices escudos |
|------|--|---------------------|---|-----------------------------|---|
| | 10 ³ contos | basis = 100 | 10 ³ contos | 10 ³ inhabitants | |
| 1833 | 220 | 53 | 415 | 3,584 | 116 |
| 1834 | 232 | 62 | 374 | 3,606 | 104 |
| 1835 | 232 | 75 | 309 | 3,627 | 85 |
| 1836 | 222 | 69 | 322 | 3,649 | 88 |
| 1837 | 217 | 56 | 388 | 3,671 | 106 |
| 1838 | 203 | 56 | 362 | 3,693 | 98 |
| 1839 | 201 | 58 | 347 | 3,715 | 93 |
| 1840 | 206 | 64 | 322 | 3,737 | 86 |
| 1841 | 215 | 67 | 321 | 3,748 | 86 |
| 1842 | 228 | 60 | 380 | 3,759 | 101 |
| 1843 | 234 | 57 | 411 | 3,771 | 109 |
| 1844 | 229 | 49 | 467 | 3,782 | 124 |
| 1845 | 226 | 49 | 461 | 3,793 | 122 |
| 1846 | 226 | 60 | 377 | 3,804 | 99 |
| 1847 | 227 | 58 | 391 | 3,816 | 103 |
| 1848 | 227 | 52 | 437 | 3,827 | 114 |
| 1849 | 225 | 55 | 409 | 3,838 | 107 |
| 1850 | 224 | 61 | 367 | 3,850 | 95 |
| 1851 | 225 | 57 | 395 | 3,861 | 102 |
| 1852 | 237 | 56 | 423 | 3,873 | 109 |
| 1853 | 234 | 68 | 344 | 3,884 | 89 |
| 1854 | 234 | 80 | 292 | 3,892 | 75 |
| 1855 | 248 | 78 | 318 | 3,901 | 82 |
| 1856 | 261 | 94 | 278 | 3,909 | 71 |
| 1857 | 278 | 81 | 343 | 3,923 | 87 |
| 1858 | 289 | 75 | 385 | 3,960 | 97 |
| 1859 | 283 | 82 | 345 | 3,998 | 86 |
| 1860 | 282 | 79 | 357 | 4,035 | 88 |
| 1861 | 301 | 83 | 363 | 4,110 | 88 |
| 1862 | 325 | 84 | 387 | 4,149 | 93 |
| 1863 | 333 | 81 | 411 | 4,188 | 98 |
| 1864 | 348 | 83 | 419 | 4,213 | 100 |
| 1865 | 353 | 81 | 436 | 4,238 | 103 |
| 1866 | 344 | 83 | 414 | 4,264 | 97 |
| 1867 | 360 | 88 | 409 | 4,289 | 95 |

seg. Table 1

| Year | Gross domestic product market current prices | Price index 1914 | Gross domestic product market 1914 prices | Population | Per capita gross domestic product 1914 prices escudos |
|------|--|---------------------|---|-----------------------------|---|
| | 10 ³ contos | basis = 100 | 10 ³ contos | 10 ³ inhabitants | |
| 1868 | 366 | 83 | 441 | 4,314 | 102 |
| 1869 | 380 | 82 | 463 | 4,340 | 107 |
| 1870 | 392 | 78 | 503 | 4,366 | 115 |
| 1871 | 385 | 76 | 507 | 4,392 | 115 |
| 1872 | 407 | 76 | 536 | 4,418 | 121 |
| 1873 | 433 | 79 | 548 | 4,444 | 123 |
| 1874 | 462 | 82 | 563 | 4,471 | 126 |
| 1875 | 492 | 82 | 600 | 4,497 | 133 |
| 1876 | 501 | 83 | 604 | 4,524 | 133 |
| 1877 | 509 | 93 | 547 | 4,551 | 120 |
| 1878 | 505 | 92 | 549 | 4,591 | 120 |
| 1879 | 492 | 88 | 559 | 4,632 | 121 |
| 1880 | 502 | 83 | 605 | 4,673 | 129 |
| 1881 | 524 | 85 | 616 | 4,715 | 131 |
| 1882 | 535 | 86 | 622 | 4,757 | 131 |
| 1883 | 532 | 82 | 649 | 4,799 | 135 |
| 1884 | 557 | 77 | 723 | 4,842 | 149 |
| 1885 | 578 | 75 | 771 | 4,885 | 158 |
| 1886 | 608 | 76 | 800 | 4,929 | 162 |
| 1887 | 623 | 75 | 831 | 4,973 | 167 |
| 1888 | 662 | 75 | 883 | 5,017 | 176 |
| 1889 | 681 | 80 | 851 | 5,062 | 168 |
| 1890 | 679 | 88 | 772 | 5,105 | 151 |
| 1891 | 681 | 86 | 792 | 5,138 | 154 |
| 1892 | 699 | 88 | 794 | 5,182 | 153 |
| 1893 | 703 | 89 | 790 | 5,220 | 151 |
| 1894 | 717 | 91 | 788 | 5,251 | 150 |
| 1895 | 763 | 87 | 877 | 5,275 | 166 |
| 1896 | 787 | 88 | 894 | 5,297 | 169 |
| 1897 | 782 | 93 | 841 | 5,331 | 158 |
| 1898 | 792 | 97 | 816 | 5,365 | 152 |
| 1899 | 806 | 95 | 848 | 5,407 | 157 |
| 1900 | 829 | 93 | 891 | 5,450 | 164 |
| 1901 | 811 | 92 | 882 | 5,497 | 160 |
| 1902 | 816 | 89 | 917 | 5,552 | 165 |
| 1903 | 843 | 92 | 916 | 5,613 | 163 |
| 1904 | 859 | 97 | 886 | 5,670 | 156 |
| 1905 | 864 | 96 | 900 | 5,720 | 157 |
| 1906 | 874 | 96 | 910 | 5,758 | 158 |
| 1907 | 903 | 96 | 941 | 5,800 | 162 |
| 1908 | 928 | 97 | 957 | 5,840 | 164 |

seg. Table 1

| Year | Gross domestic product market current prices | Price index 1914 | Gross domestic product market 1914 prices | Population | Per capita gross domestic product 1914 prices escudos |
|------|--|---------------------|---|-----------------------------|---|
| | 10 ³ contos | basis = 100 | 10 ³ contos | 10 ³ inhabitants | |
| 1909 | 941 | 98 | 960 | 5,883 | 163 |
| 1910 | 947 | 94 | 1,007 | 5,937 | 170 |
| 1911 | 906 | 99 | 915 | 6,004 | 152 |
| 1912 | 936 | 98 | 955 | 6,008 | 159 |
| 1913 | 950 | 101 | 941 | 6,004 | 157 |
| 1914 | 862 | 100 | 862 | 6,053 | 142 |
| 1915 | 976 | 110 | 887 | 6,107 | 145 |
| 1916 | 1,173 | 129 | 909 | 6,147 | 148 |
| 1917 | 1,248 | 148 | 843 | 6,186 | 136 |
| 1918 | 1,488 | 240 | 620 | 6,104 | 102 |
| 1919 | 1,846 | 268 | 689 | 6,082 | 113 |
| 1920 | 2,629 | 420 | 626 | 6,084 | 103 |
| 1921 | 3,366 | 606 | 555 | 6,148 | 90 |
| 1922 | 5,405 | 707 | 764 | 6,216 | 123 |
| 1923 | 8,049 | 1,022 | 788 | 6,271 | 126 |
| 1924 | 10,263 | 1,338 | 767 | 6,344 | 121 |
| 1925 | 11,368 | 1,295 | 878 | 6,429 | 137 |
| 1926 | 12,075 | 1,250 | 966 | 6,507 | 148 |
| 1927 | 12,680 | 1,325 | 957 | 6,580 | 145 |
| 1928 | 14,802 | 1,278 | 1,158 | 6,658 | 174 |
| 1929 | 16,632 | 1,320 | 1,260 | 6,729 | 187 |
| 1930 | 16,304 | 1,266 | 1,288 | 6,812 | 189 |
| 1931 | 15,795 | 1,148 | 1,376 | 6,908 | 199 |
| 1932 | 16,117 | 1,129 | 1,428 | 7,003 | 204 |
| 1933 | 16,450 | 1,128 | 1,458 | 7,096 | 206 |
| 1934 | 17,093 | 1,138 | 1,502 | 7,189 | 209 |
| 1935 | 17,306 | 1,140 | 1,518 | 7,279 | 209 |
| 1936 | 17,532 | 1,163 | 1,507 | 7,379 | 204 |
| 1937 | 18,289 | 1,201 | 1,523 | 7,476 | 204 |
| 1938 | 19,123 | 1,170 | 1,634 | 7,575 | 216 |
| 1939 | 19,427 | 1,114 | 1,744 | 7,677 | 227 |
| 1940 | 20,220 | 1,157 | 1,748 | 7,758 | 225 |
| 1941 | 23,986 | 1,273 | 1,884 | 7,800 | 242 |
| 1942 | 27,785 | 1,499 | 1,854 | 7,859 | 236 |
| 1943 | 30,025 | 1,657 | 1,812 | 7,934 | 228 |
| 1944 | 29,064 | 1,696 | 1,714 | 8,013 | 214 |
| 1945 | 30,230 | 1,819 | 1,662 | 8,101 | 205 |
| 1946 | 34,545 | 2,022 | 1,708 | 8,182 | 209 |
| 1947 | 38,214 | 2,073 | 1,843 | 8,258 | 223 |
| 1948 | 38,305 | 2,048 | 1,870 | 8,358 | 224 |
| 1949 | 40,667 | 2,147 | 1,894 | 8,434 | 225 |

seg. Table 1

| Year | Gross domestic product market current prices | Price index 1914 | Gross domestic product market 1914 prices | Population | Per capita gross domestic product 1914 prices escudos |
|------|--|---------------------|---|-----------------------------|---|
| | 10 ³ contos | basis = 100 | 10 ³ contos | 10 ³ inhabitants | |
| 1950 | 42,255 | 2,097 | 2,015 | 8,512 | 237 |
| 1951 | 45,798 | 2,196 | 2,086 | 8,547 | 244 |
| 1952 | 46,878 | 2,245 | 2,088 | 8,563 | 244 |
| 1953 | 49,062 | 2,196 | 2,234 | 8,587 | 260 |
| 1954 | 50,650 | 2,147 | 2,359 | 8,607 | 274 |
| 1955 | 53,597 | 2,196 | 2,441 | 8,657 | 282 |
| 1956 | 57,769 | 2,270 | 2,545 | 8,698 | 293 |
| 1957 | 60,750 | 2,270 | 2,676 | 8,737 | 306 |
| 1958 | 64,466 | 2,295 | 2,809 | 8,789 | 320 |
| 1959 | 68,760 | 2,319 | 2,965 | 8,837 | 336 |
| 1960 | 74,860 | 2,369 | 3,160 | 8,891 | 355 |
| 1961 | 80,607 | 2,418 | 3,334 | 8,944 | 373 |
| 1962 | 85,655 | 2,418 | 3,542 | 9,002 | 394 |
| 1963 | 92,903 | 2,467 | 3,766 | 9,040 | 417 |
| 1964 | 100,505 | 2,517 | 3,993 | 9,053 | 441 |
| 1965 | 112,073 | 2,615 | 4,286 | 8,996 | 476 |
| 1966 | 122,678 | 2,739 | 4,479 | 8,871 | 505 |
| 1967 | 137,118 | 2,838 | 4,832 | 8,798 | 549 |
| 1968 | 149,057 | 2,862 | 5,208 | 8,743 | 596 |
| 1969 | 163,382 | 3,035 | 5,383 | 8,696 | 619 |
| 1970 | 185,668 | 3,134 | 5,924 | 8,648 | 685 |
| 1971 | 207,799 | 3,282 | 6,331 | 8,642 | 733 |
| 1972 | 241,704 | 3,528 | 6,851 | 8,622 | 795 |
| 1973 | 294,062 | 3,849 | 7,640 | 8,545 | 894 |
| 1974 | 353,226 | 4,565 | 7,738 | 8,891 | 870 |
| 1975 | 392,478 | 5,305 | 7,398 | 9,457 | 782 |
| 1976 | 483,975 | 6,144 | 7,877 | 9,685 | 813 |
| 1977 | 653,963 | 7,698 | 8,495 | 9,737 | 872 |
| 1978 | 822,625 | 9,376 | 8,774 | 9,772 | 898 |
| 1979 | 1,033,954 | 11,079 | 9,333 | 9,800 | 952 |
| 1980 | 1,306,548 | 13,522 | 9,662 | 9,828 | 983 |
| 1981 | 1,561,466 | 15,964 | 9,781 | 9,892 | 989 |
| 1982 | 1,905,410 | 19,271 | 9,887 | 9,969 | 992 |
| 1983 | 2,391,500 | 24,033 | 9,951 | 10,050 | 990 |
| 1984 | 2,925,991 | 29,955 | 9,768 | 10,129 | 964 |
| 1985 | 3,661,467 | 36,370 | 10,067 | 10,185 | 988 |

B - *General remarks on the estimates*

It must be stressed that the estimates presented have not the same quality for the whole period under consideration. Rough estimates of the margins of error of the estimates can be found in the appendix. In a general appraisal, we may say that the estimates for the years until the 1850's are not much better than educated guesses, that the estimates for the years 1851-1946 are acceptable, and that the data from 1947 on are as good as official estimates usually are.

On the whole, these new estimates led to quite different results from the previous ones, such as those of *Valério, 1983, Valério, 1986, Mata, 1987, Justino, 1987, and Nunes, 1989*. They also invalidated some ideas based on the previous estimates. These new perspectives will be discussed in the second part of this paper. Of course, we now think we have got more accurate figures. This conviction is based on the analysis of long-term trends, short-term fluctuations, and international comparisons made in the second part of this paper.

2. Debates and controversies on Portuguese economic growth

A - *Portuguese economic growth: long-term trends*

An attempt to break down the evolution of the Portuguese economy between 1833 and 1985 into significant periods on the basis of the estimates presented in the first part leads to the following results:

- a) Near stagnation until the 1850's (1833-1859).
- b) Moderate and irregular growth in the 1860's, 1870's and 1880's (1860-1888).
- c) Near stagnation between the 1890's and the first world war (1889-1913).
- d) Serious setbacks during the two world wars and the post-first world war years (1914-1921 and 1942-1945).

e) Moderate and irregular growth in the inter-war period (1922-1941).

f) Important and continuous growth between the second world war and the 1970's (1946-1973).

g) Moderate and irregular growth since the mid-1970's (1974-1985).

A look at some detailed figures for these periods will show the rationale of such a periodization:

Table 2
PORTUGUESE ECONOMIC GROWTH: MAIN PERIODS

| Period | Trends in rates of growth per year (percentage) | | |
|-----------|---|------------|-----------------------------------|
| | Real gross domestic product | Population | Per capita gross domestic product |
| 1833-1859 | -0.2 | +0.4 | -0.6 |
| 1860-1888 | +2.8 | +0.7 | +2.1 |
| 1889-1913 | +0.9 | +0.8 | +0.1 |
| 1914-1921 | -7.1 | +0.1 | -7.2 |
| 1922-1941 | +4.7 | +1.2 | +3.5 |
| 1942-1945 | -3.8 | +1.0 | -4.8 |
| 1946-1973 | +5.4 | +0.2 | +5.2 |
| 1974-1985 | +2.9 | +0.9 | +2.0 |
| 1833-1985 | +2.1 | +0.7 | +1.4 |

| Period | Numer of years of per capita gross domestic product | | | |
|-----------|---|----------------|------------|-------|
| | Decrease (a) | Stagnation (b) | Growth (c) | Total |
| 1833-1859 | 13 | 1 | 12 | 26 |
| 1860-1888 | 3 | 5 | 21 | 29 |
| 1889-1913 | 10 | 5 | 10 | 25 |
| 1914-1921 | 5 | 0 | 3 | 8 |
| 1922-1941 | 3 | 4 | 13 | 20 |
| 1942-1945 | 4 | 0 | 0 | 4 |
| 1946-1973 | 0 | 3 | 25 | 28 |
| 1974-1985 | 3 | 3 | 6 | 12 |
| 1833-1985 | 41 | 21 | 90 | 152 |

(a) Rate of growth per year in the interval] - ∞, -1%].

(b) Rate of growth per year in the interval] -1%, +1% [.

(c) Rate of growth per year in the interval [+1%, + ∞ [.

Before any attempt to make general comments about the evolution of the Portuguese economy during the whole period

under consideration, let us examine in detail each of the shorter periods we have just identified.

B - Portuguese economic growth: the main periods

B.1 - The near stagnation period 1833-1859

Two aspects of this period deserve special attention: the low starting point, and the stagnant trend itself.

Our estimates for the 1830's are very different from those presented in *Bairoch, 1976*. In the case of real gross domestic product our figure for 1835 is 605 million dollars as against 860 million dollars for 1830 in Bairoch's estimate, and in the case of per capita gross domestic product our figure for 1835 is 165 dollars as against 250 dollars for 1830 in Bairoch's estimate (for conversion of figures expressed in 1914 *escudos* into figures expressed in 1960 dollars see the appendix; note also that our population figure is much higher than the population figure implicit in Bairoch's estimates of 3,440,000 people). This is an important downward revision of the Portuguese starting point in the 1830's, but we believe it is quite reasonable. As a matter of fact, during the previous decades Portuguese society had faced many dramatic situations: three wars against revolutionary and imperial France and its allies (1795-1797, 1801, 1807-1814); French and British occupations (partial or total French occupation of the continental part of the country between 1807 and 1811; British informal occupation first of the Atlantic islands, then of the continental part of the country between 1807 and 1820); the loss of Brazil (the economic colonial pact was abrogated in 1808, a United Kingdom of Portugal and Brazil was established in 1816, and full independence was proclaimed in 1822 and recognized by Portugal in 1825); and internal conflicts that culminated in a civil war between absolutist and constitutionalist parties (1828 in the continental part of the country, 1828-1832 in the Azores, 1832-1834 in the continental part of

the country again). Whatever prosperity there was in the last quarter of the XVIIIth century was plausibly lost in these upheavals.

The stagnation during the period 1835-1860 is a much more surprising fact. It is true that political and social unrest persisted between the mid-1830's and the early 1850's, and the protectionist tariff adopted in 1837 (lowered in 1852, mainly for agricultural commodities) was of doubtful help. However, problems were less serious than between the mid-1790's and the mid-1830's, and it may be argued that the new institutional framework provided by the constitutional regime was favourable to economic growth. Of course, our estimates may give a wrong picture of what happened during these decades, but we may also suggest that institutional reforms were not complete (as we shall see later), and that something more than good institutions was necessary to foster Portuguese economic growth.

The large margins of error of the estimates for this period make a short-term analysis meaningless. Let us, however, note that the severe crisis of the mid-1850's is quite plausible even if exaggerated in the estimates. As a matter of fact, this was a period of epidemics of yellow fever and cholera, and of a *oidium* plague in Portuguese vineyards. As the demographic effects of the epidemics are not taken into account in population estimates, there is a downward distortion of the per capita income figures, but these were certainly very hard times.

B.2 - The growth period 1860-1890

The late 1850's and the early 1860's were a true turning point in Portuguese life. First of all, some important institutional reforms were accomplished. These were: the adoption of the gold-standard (1854), and of the metric system (1857), and the abolition of entails (1863). Secondly, the whole state machinery seems to have significantly improved its efficiency (at least it started to produce regular statistical data). Thirdly, a network of

commercial banking institutions began to spread over the country. Last but not least, communication facilities between Portugal and foreign countries and between the various regions of the country were built. For instance, the first Portuguese railways (the Portuguese section of the Lisbon-Madrid line, the Lisbon-Gaia line, and a Lisbon-Alentejo line) were constructed between 1856 and 1864 (note that the Gaia-Oporto railway bridge over the Douro only came in 1877).

This corresponds to the full implementation of what was called in *Valério, 1986* the liberal (or regeneration) blueprint for the role of the government in Portuguese economic growth. Our estimates show that the economic response was quite positive. The index of industrial production presented in *Reis, 1987* already suggested an annual rate of growth in the range 2.5-3.0% for that sector in the 1870' and 1880's. We may now conclude that agricultural growth must have been at least similar to ensure the overall performance in the same range given by our estimates. This contradicts what is said in *Valério, 1986* and *Mata, 1989* about the delayed success of the institutional and investment effort of the state (but not what is said in *Mata, 1989* about the inability of the state to increase public receipts as much as was needed to avoid chronic public deficits).

Two short depressions, in the mid-1860's and in the mid-1870's interrupted this period of growth. The depression of the mid-1860's is generally explained by the decrease in emigrants remittances from Brazil associated with the Paraguay war. The depression of the mid-1870's is generally explained by the crash of financial speculation based on the boom of the emigrants remittances that followed the end of the Paraguay war, and by the *phyloxera* plague that affected the Portuguese vineyards in the 1870's.

B.3 - The near stagnation period 1890-1914

Of course, short-term difficulties of the Portuguese economy in the XIXth century were often the consequence of bad

harvests. This is quite normal in an economy in which the agricultural sector was still dominant. However, the Portuguese economy also showed some sensitivity to fluctuations in the international economy, mainly in Great Britain and Brazil. This is not surprising if we remember that after the loss of the legal monopoly of Brazilian external trade in 1808, the Portuguese balance of payments was always on the verge of wide deficits, when the high trade and transportation deficits (mainly with Great Britain) were not covered by emigrant remittances (mainly from Brazil), or by foreign loans (from the European markets). Some short-term fluctuations prior to the late 1880's illustrate these connections as we have already noticed.

The crisis of the late 1880's and early 1890's is, however, the most paradigmatic in this perspective. A shortage in the emigrant remittances from Brazil, due to local unrest related to the political changes that occurred in 1888-1891 was perhaps the immediate cause of the problems. A colonial diplomatic crisis with Great Britain in 1890 helped to worsen the situation. Then came the 1891-1892 international financial crisis and Portugal had to abandon the gold-standard (July 1891), and to suspend the payment of part of the service of its external public debt (June 1892).

The agricultural protectionist measures taken in 1889, and the end of the structural economic policy directed towards the building of transportation facilities and of other social infrastructures in consequence of the financial problems of the state complete the picture explaining why the Portuguese economy was led to a not very typical "belle époque". Colonial expansion was, for many people at that time, a good alternative as an economic stimulant. However, it is doubtful if it proved to be an efficient one.

Reis, 1987 points to rates of growth for industry during this period in the range 2.0-2.5%. This means agricultural growth must have been much less to ensure the overall performance of about 1.0% given by our estimates. This agricultural stagnation

may be the cause of the rise of emigration on the eve of the first world war. All this helps to explain the rise of the republican party, that led to the fall of the monarchy in 1910. At the same time, the explanations sought in *Valério, 1986* regarding the absence of coincidence between the period of important public investment (1850's-1880's) and the period of higher economic growth, become irrelevant.

B.4 - The setback during the First World War

The shortage of external supplies of some vital commodities, such as foodstuffs (like wheat), and fuels (like coal) not to mention transportation services (where British vessels were dominant) was the main problem the Portuguese economy had to face during the First World War. As a matter of fact, there were no military operations in Portuguese territory; the sinking of Portuguese ships by German submarines was the only important capital damage incurred, and even this was compensated by the requisition of German ships harboured in Portuguese ports (what remained of these ships was later taken as war indemnity according to the Treaty of Versailles). However, Portugal could not profit from the higher demand of the main belligerents, because its industrial structure was unable to respond to such a demand.

Besides this, there was an inflationary process, resulting from the combination of commodity shortages with a rising money supply. This rise in money supply was in itself the result of central bank loans to finance the high public deficit due to the war expenditures.

Things were not dramatic as long as Portugal was fighting only in its African colonies against sporadic German attacks (1914-1916). After the German declaration of war (March 1916) however, Portuguese troops were sent to Flanders and there was some bitter fighting on the Mozambique/Tanganika frontier. At the same time, the Portuguese economy was thrown into a very

deep crisis that lasted until 1921. Social and political unrest accompanied this economic crisis: several coups d'état and even a short civil war between monarchic and republican parties (winter 1919) dominated the Portuguese life of these years.

B.5 - The inter-war period

Recovery from the deep first world war crisis began in 1921, but inflation continued to rise until 1924, perhaps because of the depreciation of Portuguese currency due to the uncertainty about the payment of war indemnities and debts. When this problem was solved, by the mid-1920's, inflation was tamed by successful short-term policies. At the same time, a structural economic policy based in the development of primary and technical education was pursued by the republican governments. All this explains why Portugal was able to achieve general prosperity in the late 1920's.

However, economic stability had not been recovered in time to ensure the survival of the democratic regime overthrown by the army in 1926. The jump in per capita income in 1928 (almost certainly exaggerated in the estimate), and the absence of any setback associated with the so-called great depression certainly helped to stabilize the new authoritarian political regime that would last until the 1970's.

Looking at the European context, the performances of the 1920's and of the 1930's may be considered perfectly normal. Anyway, short-term economic policies implemented from 1922 on certainly helped. Classical deflationary measures to fight inflation and intervention in exchange markets to fight depreciation were the policies of the 1920's. An original mix of deflationary and inflationary measures (balanced budget, currency depreciation, and low interest rate) was the Portuguese response to the great depression. This may explain why only the 1936 international crisis had discernible effects on the Portuguese economy, perhaps in consequence of the outbreak of the Spanish

civil war with all its disturbing consequences for a neighbour country.

B.6 - The setback during the Second World War

The setback resulting from the second world war was much less serious than the setback resulting from the first world war. This was mainly the consequence of Portuguese non-belligerency during the second world war. Anyway the shortage of foreign supplies of vital commodities and the inflationary process were quite similar, if we except the fact that the highly positive balance of payments was now the cause of the growth of money supply.

Some kind of prosperity due to the soaring of raw tungsten exports and to invisible inflows linked to the presence of many refugees also helped to diminish the negative impact of the war economy, and to ensure that problems did not last beyond the end of the war.

B.7 - The Post-Second World War period

With the exception of the 1948-1949 slowdown, and of the almost imperceptible 1952 recession, the years between the second world war and the international crisis of the mid-1970's were a very prosperous period. Even the war against pro-independence parties in the African colonies of Angola, Guinea-Bissau, and Mozambique, did not affect this growth in the 1960's and early 1970's.

Sustained growth in the world economy, substantial emigrants' remittances from highly developed European countries, and participation in European economic integration (Portugal was a member of the EOEC — and then of OECD — from its beginnings, belonged to EFTA between 1959 and 1985, and is an EEC member since 1986) were the main aspects of the

favourable international background of the post-second world war period that certainly helped the expansion of the Portuguese economy. Internal factors were, however, also important. Traditional obstacles to sustained growth seemed to have been overcome, as we shall see later in more detail.

B.8 - Recent times since 1974

From the 1970's on the situation changed. The Portuguese economy showed high sensitivity to oil-shocks and to stop-and-go policies implemented because of external financial difficulties, and short depressions alternated with periods of growth (anyway, the situation would look better if we considered the period 1985-1988 which was undoubtedly a prosperous one). In this context, the impact of the first oil shock certainly helped to create the short-term background for the 1974 revolution and for the political unrest that lasted until 1976, and the good average performance of the following years was certainly favourable to the stabilization of the new democratic regime.

C - *Portuguese economic growth: international comparisons and general comments*

C.1 - The XIXth and early XXth centuries

Judged by international standards the performance of the Portuguese economy was rather poor in the near stagnation periods of 1833-1860 and 1890-1914 and during the first world war. Because of this, the good performance of the years 1860-1890 was not enough to avoid a general trend of retardation between the 1830's and the 1920's. A comparison of Portuguese figures with Bairoch's figures for Europe taken from *Bairoch, 1976* will illustrate this fact.

Table 3a
 PORTUGUESE ECONOMIC GROWTH:
 INTERNATIONAL COMPARISONS 1833-1920

| Year | Per capita gross domestic product 1960 USA dollars | | Period | Rate of growth of per capita gdp per year percentage | |
|----------|---|--------|-----------|--|--------|
| | Portugal | Europe | | Portugal | Europe |
| 1830 (a) | (b)167 | 240 | 1830-1860 | (c)-0.2 | +0.9 |
| 1860(a) | 159 | 310 | 1860-1890 | +2.0 | +0.8 |
| 1890(a) | 286 | 388 | 1890-1913 | 0 | +1.4 |
| 1913 | 284 | 534 | 1913-1920 | -5.9 | -3.3 |
| 1920 | 186 | 422 | | | |

(a) Three-year annual averages.

(b) 1835.

(c) 1835-1860.

It is clear that until the 1920's the Portuguese economy was not able to achieve sustained growth. External dependence, traditional institutions, and lack of natural, human and produced resources have been advanced as general explanations for such a situation. Let us make a brief analysis of their explanatory capacity.

It is clear from our estimates that periods of higher integration in the world economy were periods of higher growth. This seems to undermine the external dependence thesis. On the contrary, theses that stress wrong or insufficient specialization in the international economy become reinforced.

Institutional reforms appear as necessary but not sufficient conditions for economic growth. For instance, the institutional reforms of the 1850's and 1860's were important to ensure the 1860-1890 period of growth, but were unable to sustain that growth after 1890.

Let us add some remarks about specific institutional aspects. Efficient implementation of good structural (and short-term) economic policies were certainly helpful to economic growth, as the above comments about the main periods of the evolution of the Portuguese economy largely showed. Banking institutions

never assumed the investment bank features that seem more in keeping with the degree of backwardness of the Portuguese economy. Excessive fragmentation of landed property in the northern part of the country and in the Atlantic islands, and latifundia in the southern part of the country have been also blamed as an obstacle to the improvement of agricultural productivity. However, studies like *Reis, 1982* cast serious doubts on such hypotheses.

Lack of natural resources is a complex matter. Portugal is not endowed with plenty of good soils and mineral ores. These circumstances are, of course, not very favourable to economic growth. However, Portugal is neither an extreme case of bad climate nor of inaccessibility of the existing natural resources. This means that problems with natural resources could be overcome through foreign trade. Such a solution had, in fact, been contemplated but was not pushed far enough to ensure modern economic growth in the XIXth and early XXth centuries. This may be considered as a problem of lack of initiative, which brings us to the human resources problem.

Lack of human resources was mainly a qualitative matter. The population grew, as we have seen above, although not at a high rate. The real problem was poor basic and technical education, and lack of entrepreneurial initiative. We will not enter into details about the reasons, for instance, of the high illiteracy rate or of the absence of good engineers and managers, because this would take too much space. It may be suggested, however, that the inefficiency of the formal education system contributed to this poor result because of low private demand due to cultural features, low public expenditure due to the financial problems of the state, and high cost due to geographical conditions.

Lack of produced resources is not systematically proved with statistical data, but it is perfectly evident (let us recall, for instance, the late building of the first Portuguese railways). It was probably a consequence of a low savings rate and of low capital imports. The low savings rate is, of course, the result of

cultural features that make for dominant specific inter-temporal preferences which are unfavourable to economic growth. The low capital imports may be explained by the traditional behaviour of the Portuguese state as a bad debtor, which suggested a high degree of risk for investments in Portugal not compensated by sufficiently high profitability. Once more, it is impossible to go into details about these problems, because this would take too much space.

C.2 - The XXth century since the First World War

It is clear that since the 1920's the Portuguese economy has been able to achieve sustained growth and to make a clear (but not very spectacular) recovery when judged by international standards. This may be proved pushing the comparison with European figures based on the data of *Bairoch, 1976* as far as possible.

Table 3b
PORTUGUESE ECONOMIC GROWTH:
INTERNATIONAL COMPARISONS 1920-1973

| Year | Per capita gross domestic product 1960 USA dollars | | Period | Rate of growth of per capita gdp per year percentage | |
|------|---|--------|-----------|--|--------|
| | Portugal | Europe | | Portugal | Europe |
| 1920 | 186 | 422 | 1920-1929 | +6.9 | +3.4 |
| 1929 | 339 | 571 | 1929-1939 | +1.6 | +1.8 |
| 1938 | 391 | 671 | 1938-1946 | -0.4 | -2.5 |
| 1946 | 378 | 549 | 1946-1950 | +3.2 | +8.1 |
| 1950 | 428 | 749 | 1950-1973 | +6.0 | +4.5 |
| 1973 | 1,618 | 2,077 | 1973-1985 | +0.8 | — |

How was it possible to overcome the obstacles to sustained economic growth we identified for the XIXth and early XXth centuries? Higher integration in the world economy, a better institutional context, and greater availability of resources are the obvious answers to such a question.

Higher commercial integration in the world economy is clear since the 1920's. The authoritarian political regime that prevailed in Portugal between 1926 and 1974 has often been blamed for an autarchic policy in economic matters. Neither the ratios of exports and imports to gross domestic product, nor institutional facts (let us recall Portuguese links to the European economic integration process from its very beginnings) support such a perspective. Of course, the situation was very different before the Second World War and after the conflict, but this was a mere consequence of the international context. The absence of serious international payments problems until the 1970's was another positive factor. The presence of foreign capital in the Portuguese economy will be dealt with later.

Outstanding institutional changes occurred mainly in the field of state intervention in economic life. We may distinguish three periods: the post-first world war years, the era of the authoritarian regime, and the post-1974 years.

The Post-First World War years saw a new structural economic policy, that will be dealt with again in the context of the problem of human resources, systematic short-term economic policies — a novelty that appeared in the context of the fight against inflation — and an attempt to create a set of public enterprises. Some of these public enterprises were traditional public services with a new kind of management (in savings banks and railroads, for instance); others were an attempt to break into new areas (like sea transportation or social security). Poor results led to the dismantling of this set of public enterprises in the late 1920's.

Administrative control of the creation and expansion of big industrial firms (the so-called industrial conditioning) and public contributions to the originating capital of corporations in new vital making (like hydro-electric plants, air transportation, and steelurgy), leading to the formation of mixed capital enterprises, were the devices used by the new authoritarian regime to stimulate economic development. Their inefficiency has been blamed

for the sluggish growth of the Portuguese economy between the 1930's and the 1960's. It is certainly difficult to endorse such a perspective looking at the comparison between Portuguese and European growth above, even if we recognise that industrial conditioning was a brake to competition. Anyway, industrial conditioning was laid aside in the mid-1960's, in the context of a change in explicit development strategy from import substitution to export-led growth.

Systematic nationalization of mixed enterprises and of other big firms and of key sectors of the economy was attempted in the mid-1970's, together with an agrarian reform to destroy private latifundia in the southern part of the country. One decade and a half later the proclaimed intention is to promote privatization in the non-agricultural sector and to reduce the new collectively self-managed latifundia of the south, because of the inefficiency of the solutions of the 1970's. Once more it is fair to suspect that these indictments are exaggerated even if partially correct.

The structural policy directed towards education implemented during the democratic republican regime that prevailed in Portugal between 1910 and 1926 was certainly decisive in the overcoming of the problem of the lack of human resources. It is true that progress was very slow in these matters and that the situation is not quite satisfactory even today. The gradual improvement of the main indicators is, however, clear from the 1920's on.

The evolution of the savings rate is not statistically documented. However we may plausibly suppose that a change in cultural attitudes from the prevalence of hoarding to the prevalence of remunerative application occurred during the first half of the XXth century, with positive effects on economic growth.

During the first half of the XXth century, the Portuguese state was unable to borrow in international markets as a consequence of the partial bankruptcy of 1892. However, this does

not mean that foreign capital was absent from the Portuguese economy. Direct foreign investment was important in some sectors. Anyway, the 1950's were a turning point in this field. Marshall aid heralded the reopening of international markets to Portuguese public loans, and direct investment grew significantly. Such trends have prevailed until the present, in spite of some external payments problems in the 1970's and 1980's.

Conclusion

Great improvements to the retrospective national accounts presented in the first part are, of course, still possible in the future. Gathering of data on production in different branches of activity, for the formation of production indexes (such as was attempted in the case of the industrial sector in *Reis, 1987*) is the most pressing need. Together with more data on individual prices, especially in the non-agricultural sectors, and on the consumption structure to improve the adequacy of the weights of price indexes, these efforts may make it possible to correct the estimates of gross domestic product and its deflator, and to reduce their margins of error.

As far as population is concerned, we believe efforts should be directed to the study of vital and migratory movements in the decades prior to the 1890's. Population estimates for the last decade of the XIXth century and for the XXth century are fairly accurate, but short-term fluctuations in the XIXth century are still obscure.

More work must also be done to explain both the retardation of the Portuguese economy as against European and world leaders and even averages until the First World War, and the recovery made since the 1920's. We believe that a careful comparative approach, mainly in the South European or in the Mediterranean context will be the most fruitful research path.

APPENDIX

1 - Computation of gross domestic product at current market prices

A - Methodology

The Portuguese statistical office (Instituto Nacional de Estatística) has published a series of national accounts of the continental part of the country for the years 1938 and 1947-1985. In her doctoral thesis (Nunes, 1989), Ana Bela Nunes tried to adjust the figures of gross domestic product at factor cost and current prices for the years 1938 and 1947-1980 to include the islands of Azores and Madeira, using labour force data and the assumption of equal productivity throughout the country in each branch of activity. In this paper, the adjustment was extended to the years 1981-1985, assuming gross domestic product at factor cost and current prices of the islands of Azores and Madeira in those years to be 4.4% of the gross domestic product at factor cost of the continental part of the country, as in 1980. An estimate of gross domestic product at current market prices for the whole country in the years 1938 and 1947-1985 was then obtained by adding to the adjusted figures of gross domestic product at factor cost and current prices those of indirect taxes net of subsidies to production given by the official national accounts data. However, we decided not to use the 1938 figure in our computations because it is widely recognised to be largely undervalued.

For the years 1851, 1855, 1856, 1861 and 1865-1946, we computed an estimate of gross domestic product at current market prices for the whole country using exports, fiscal receipts and public expenditure as proxy variables for gross domestic product, and assuming the elasticities of gross domestic product to these proxy variables in these years to be the same as in the years 1947-1985. Two other potential proxy variables for which data was available were not used. The decision not to use imports was taken because their elasticity was statistically not significant, according to the t-test. The decision not to use money supply was taken because we believe that there was a change in the behaviour of economic units towards money during the period under consideration that would make the use of any series corresponding to the usual definitions of money supply meaningless (for further discussion of this issue see Valério, 1984 and Mata, 1987).

The multiple double logarithmic regression of the adjusted official figures of gross domestic product at market current prices on the proxy variables with serial auto-correlation of the first order corrected by the Cochrane-Orcutt method gave the following results:

| | | | |
|------------------------------|--------|------------------------------|-------|
| Dependent variable | ln gdp | Correlation coefficient | 1.000 |
| No. of observations | 38 | Determination coefficient | 0.999 |
| Standard error | 0.023 | Adjusted determination coef. | 0.999 |
| F-statistic | 1315 | Durbin-Watson statistic | 1.619 |
| Intercept term | 1.800 | Rho-parameter | 0.479 |
| Independent variables | ln exp | ln fr | ln pe |
| Elasticity | 0.136 | 0.447 | 0.273 |
| Standard error of elasticity | 0.031 | 0.075 | 0.059 |
| t-statistic of elasticity | 4.329 | 5.973 | 4.658 |

where:

- gdp denotes gross domestic product at current market prices;
- exp denotes exports;
- fr denotes fiscal receipts;
- pe denotes public expenditure.

The estimate of gross domestic product at market current prices for the above mentioned years was computed using the formula:

$$\text{gdp} = 31.653 \exp^{0.136} \text{fr}^{0.447} \text{pe}^{0.273}$$

based on the previous regression.

For the years 1852-1854, 1857-1860, and 1862-1864, we interpolated the estimate for adjacent years according to the evolution of fiscal receipts and public expenditure, because data about exports was not available. We used the formulas:

| Years | Formula |
|-----------|--|
| 1852-1854 | $43.233 \text{fr}^{0.447} \text{pe}^{0.273}$ |
| 1857-1860 | $45.501 \text{fr}^{0.447} \text{pe}^{0.273}$ |
| 1862-1864 | $45.719 \text{fr}^{0.447} \text{pe}^{0.273}$ |

where the new constant coefficients were computed to be the average of the values of $31.653 \exp^{0.136}$ for the adjacent years.

For the years 1833-1845, 1848, and 1850, we extrapolated the above mentioned estimate according to the evolution of the available proxy variables. We used the formulas:

| Years | Formula |
|--------------------------------|---|
| 1833-1841, 1844, 1845 and 1850 | $116.557 \text{pe}^{0.273}$ |
| 1842 and 1843 | $87.831 \exp^{0.136} \text{pe}^{0.273}$ |
| 1848 | $169.548 \exp^{0.136}$ |

where the new constant coefficients were computed to be the values of, re-

spectively, $31.653 \exp^{0.1366} \text{fr}^{0.447}$, $31.653 \text{fr}^{0.447}$, and $31.653 \text{fr}^{0.447} \text{pe}^{0.273}$ for 1851.

For the years 1846, 1847 and 1849, for which no proxy variables were available, we computed an estimate of gross domestic product at market current prices by exponential interpolation of the estimates for the adjacent years.

B - Sources

— Exports and imports

Data from official statistics, published by the Direcção-Geral de Estatística, or by the Instituto Nacional de Estatística, Lisboa (several issues):

1842, 1843, 1848, 1851, 1855, 1856, 1861 and 1865-1877 - *Mappas geraes do commercio de Portugal com as suas possessões e as nações estrangeiras*.

1878-1896 - *Commercio do Continente do Reino e llhas com os paises estrangeiros e as provincias ultramarinas*.

1897-1920 - *Commercio e navegação*.

1921-1985 - *Estatísticas do comércio externo*.

— Fiscal receipts

Fiscal years 1851-1852 to 1913-1914 - *Mata, 1986*.

Fiscal years 1914-1915 to 1947 - *Valério, 1982*.

Fiscal years 1948 to 1985 - *Contas Gerais do Estado* (several issues).

— Public expenditure

Fiscal years 1833-1834 to 1844-1845 and 1850-1851 - *Lobo, 1871*.

Fiscal years 1851-1852 to 1913-1914 - *Mata, 1986*.

Fiscal years 1914-1915 to 1947 - *Valério, 1982*.

Fiscal years 1948 to 1985 - *Contas Gerais do Estado* (several issues).

— Gross domestic product at current market prices.

1938 and 1947-1980 - *Nunes, 1989*, and *Contas nacionais* - Instituto Nacional de Estatística, Lisboa (several issues).

1981-1985 - *Contas nacionais* - Instituto Nacional de Estatística, Lisboa (several issues).

C - Adjustments

— Fiscal years

Fiscal years 1833-1834 to 1933-1934 began on the 1st July of each calendar year and ended on the 30th June of the following calendar year. Accord-

dingly, fiscal receipts for calendar years 1852 to 1933 and public expenditure for calendar years 1834 to 1844 and 1851 to 1933 were computed as the average of, respectively, fiscal receipts and public expenditure of the two fiscal years that included their halves. Fiscal receipts for calendar year 1851 and public expenditure for calendar years 1833, 1845 and 1850 was supposed to be equal to, respectively, fiscal receipts and public expenditure of the fiscal year that included one of their halves and for which data was available.

Fiscal year 1934-1935 began on the 1st July 1934 and ended on the 31st December 1935. Accordingly, fiscal receipts and public expenditure for calendar year 1934 were computed as the average of, respectively, fiscal receipts and public expenditure of fiscal year 1933-1934 and two-thirds of those of fiscal year 1934-1935, and fiscal receipts and public expenditure for calendar year 1935 were computed as two-thirds of, respectively, fiscal receipts and public expenditure of fiscal year 1934-1935.

Fiscal years from 1936 on coincided with calendar years. Accordingly fiscal receipts and public expenditure for calendar years 1936 to 1985 were supposed to be equal to, respectively, fiscal receipts and public expenditure of the corresponding fiscal years.

— War expenditure

The part of public expenditure on the Portuguese expeditionary corps sent to Flanders during the first world war that was spent abroad and financed by a British war loan was subtracted from public expenditure.

D - Data

| Year | Exports 10 ⁵ contos | Imports 10 ³ contos | Fiscal receipts 10 ³ contos | Public expenditure 10 ³ contos |
|------|-----------------------------------|-----------------------------------|---|--|
| 1833 | ? | ? | ? | 10 |
| 1834 | ? | ? | ? | 12 |
| 1835 | ? | ? | ? | 12 |
| 1836 | ? | ? | ? | 11 |
| 1837 | ? | ? | ? | 10 |
| 1838 | ? | ? | ? | 8 |
| 1839 | ? | ? | ? | 7 |
| 1840 | ? | ? | ? | 8 |
| 1841 | ? | ? | ? | 9 |
| 1842 | 7 | 10 | ? | 13 |
| 1843 | 7 | 12 | ? | 14 |
| 1844 | ? | ? | ? | 12 |
| 1845 | ? | ? | ? | 11 |
| 1846 | ? | ? | ? | ? |
| 1847 | ? | ? | ? | ? |
| 1848 | 8 | 11 | ? | ? |
| 1849 | ? | ? | ? | ? |

| Year | Exports 10 ³ contos | Imports 10 ³ contos | Fiscal receipts 10 ³ contos | Public expenditure 10 ³ contos |
|------|-----------------------------------|-----------------------------------|---|--|
| 1850 | ? | ? | ? | 11 |
| 1851 | 8 | 12 | 10 | 11 |
| 1852 | ? | ? | 10 | 12 |
| 1853 | ? | ? | 10 | 12 |
| 1854 | ? | ? | 9 | 12 |
| 1855 | 12 | 16 | 10 | 13 |
| 1856 | 15 | 19 | 10 | 14 |
| 1857 | ? | ? | 10 | 16 |
| 1858 | ? | ? | 11 | 18 |
| 1859 | ? | ? | 11 | 17 |
| 1860 | ? | ? | 11 | 16 |
| 1861 | 14 | 25 | 12 | 18 |
| 1862 | ? | ? | 12 | 21 |
| 1863 | ? | ? | 13 | 21 |
| 1864 | ? | ? | 15 | 21 |
| 1865 | 16 | 24 | 15 | 21 |
| 1866 | 17 | 25 | 13 | 21 |
| 1867 | 16 | 26 | 14 | 25 |
| 1868 | 16 | 24 | 15 | 25 |
| 1869 | 17 | 22 | 15 | 26 |
| 1870 | 20 | 24 | 15 | 26 |
| 1871 | 21 | 24 | 16 | 22 |
| 1872 | 23 | 27 | 17 | 24 |
| 1873 | 24 | 30 | 19 | 25 |
| 1874 | 23 | 27 | 20 | 28 |
| 1875 | 24 | 34 | 21 | 31 |
| 1876 | 21 | 30 | 22 | 35 |
| 1877 | 23 | 31 | 22 | 35 |
| 1878 | 18 | 29 | 24 | 34 |
| 1879 | 18 | 33 | 23 | 33 |
| 1880 | 25 | 32 | 22 | 32 |
| 1881 | 21 | 33 | 24 | 35 |
| 1882 | 23 | 34 | 25 | 35 |
| 1883 | 23 | 31 | 25 | 34 |
| 1884 | 23 | 33 | 26 | 36 |
| 1885 | 23 | 33 | 27 | 40 |
| 1886 | 26 | 37 | 29 | 40 |
| 1887 | 21 | 37 | 32 | 42 |
| 1888 | 23 | 38 | 33 | 47 |
| 1889 | 23 | 42 | 33 | 51 |
| 1890 | 22 | 44 | 34 | 51 |
| 1891 | 21 | 40 | 34 | 52 |
| 1892 | 25 | 31 | 35 | 50 |
| 1893 | 23 | 38 | 38 | 46 |
| 1894 | 24 | 36 | 40 | 45 |
| 1895 | 27 | 40 | 42 | 49 |

Portuguese Economic Growth 1833-1985

| Year | Exports 10 ³ contos | Imports 10 ³ contos | Fiscal receipts 10 ³ contos | Public expenditure 10 ³ contos |
|------|-----------------------------------|-----------------------------------|---|--|
| 1896 | 26 | 40 | 43 | 54 |
| 1897 | 27 | 40 | 41 | 55 |
| 1898 | 31 | 49 | 41 | 54 |
| 1899 | 29 | 51 | 43 | 55 |
| 1900 | 31 | 60 | 45 | 55 |
| 1901 | 28 | 58 | 45 | 54 |
| 1902 | 28 | 56 | 45 | 56 |
| 1903 | 31 | 59 | 46 | 57 |
| 1904 | 31 | 62 | 48 | 58 |
| 1905 | 29 | 61 | 49 | 58 |
| 1906 | 31 | 60 | 49 | 59 |
| 1907 | 30 | 61 | 49 | 66 |
| 1908 | 28 | 67 | 51 | 72 |
| 1909 | 31 | 65 | 51 | 71 |
| 1910 | 36 | 70 | 51 | 69 |
| 1911 | 34 | 68 | 48 | 66 |
| 1912 | 34 | 75 | 49 | 73 |
| 1913 | 35 | 89 | 50 | 72 |
| 1914 | 27 | 69 | 47 | 64 |
| 1915 | 34 | 76 | 46 | 92 |
| 1916 | 56 | 129 | 48 | 130 |
| 1917 | 55 | 137 | 50 | 158 |
| 1918 | 83 | 178 | 57 | 195 |
| 1919 | 107 | 229 | 77 | 234 |
| 1920 | 222 | 691 | 110 | 330 |
| 1921 | 225 | 933 | 152 | 478 |
| 1922 | 444 | 1,252 | 248 | 868 |
| 1923 | 684 | 2,229 | 439 | 1,179 |
| 1924 | 949 | 2,958 | 645 | 1,299 |
| 1925 | 862 | 2,484 | 775 | 1,468 |
| 1926 | 736 | 2,342 | 862 | 1,666 |
| 1927 | 723 | 2,663 | 939 | 1,746 |
| 1928 | 1,029 | 2,679 | 1,206 | 1,713 |
| 1929 | 1,073 | 2,529 | 1,496 | 1,809 |
| 1930 | 945 | 2,406 | 1,494 | 1,796 |
| 1931 | 812 | 1,674 | 1,461 | 1,788 |
| 1932 | 791 | 1,707 | 1,490 | 1,889 |
| 1933 | 802 | 1,905 | 1,522 | 1,952 |
| 1934 | 909 | 1,965 | 1,599 | 1,947 |
| 1935 | 923 | 2,294 | 1,651 | 1,919 |
| 1936 | 1,026 | 1,994 | 1,612 | 1,985 |
| 1937 | 1,202 | 2,353 | 1,663 | 2,035 |
| 1938 | 1,139 | 2,300 | 1,753 | 2,258 |
| 1939 | 1,336 | 2,077 | 1,685 | 2,357 |
| 1940 | 1,619 | 2,441 | 1,727 | 2,382 |
| 1941 | 2,972 | 2,468 | 1,911 | 2,787 |

| Year | Exports 10 ³ contos | Imports 10 ³ contos | Fiscal receipts 10 ³ contos | Public expenditure 10 ³ contos |
|------|-----------------------------------|-----------------------------------|---|--|
| 1942 | 3,939 | 2,477 | 2,365 | 2,928 |
| 1943 | 4,035 | 3,323 | 2,454 | 3,617 |
| 1944 | 3,166 | 3,920 | 2,526 | 3,456 |
| 1945 | 3,237 | 4,050 | 2,571 | 3,835 |
| 1946 | 4,587 | 6,857 | 2,868 | 4,394 |
| 1947 | 4,307 | 9,445 | 3,288 | 5,621 |
| 1948 | 4,295 | 10,351 | 3,495 | 5,607 |
| 1949 | 4,089 | 9,043 | 3,687 | 5,578 |
| 1950 | 5,334 | 7,879 | 3,842 | 5,025 |
| 1951 | 7,559 | 9,472 | 4,280 | 5,490 |
| 1952 | 6,811 | 9,988 | 4,548 | 5,701 |
| 1953 | 6,283 | 9,513 | 4,540 | 6,241 |
| 1954 | 7,297 | 10,085 | 4,778 | 6,513 |
| 1955 | 8,165 | 11,453 | 5,134 | 7,150 |
| 1956 | 8,621 | 12,725 | 5,465 | 7,386 |
| 1957 | 8,289 | 14,422 | 5,790 | 8,001 |
| 1958 | 8,299 | 13,809 | 6,257 | 8,440 |
| 1959 | 8,351 | 13,681 | 6,637 | 9,485 |
| 1960 | 9,408 | 15,695 | 7,270 | 11,039 |
| 1961 | 9,373 | 18,863 | 8,232 | 13,148 |
| 1962 | 10,632 | 16,830 | 8,680 | 14,530 |
| 1963 | 12,024 | 18,866 | 9,428 | 15,339 |
| 1964 | 14,831 | 22,377 | 9,750 | 16,771 |
| 1965 | 16,573 | 26,553 | 11,924 | 17,217 |
| 1966 | 17,812 | 29,406 | 12,989 | 18,615 |
| 1967 | 20,166 | 30,453 | 15,028 | 21,953 |
| 1968 | 21,917 | 33,858 | 16,510 | 24,024 |
| 1969 | 24,526 | 37,262 | 18,873 | 26,815 |
| 1970 | 27,299 | 45,495 | 23,011 | 30,765 |
| 1971 | 30,248 | 52,416 | 24,799 | 35,634 |
| 1972 | 35,255 | 60,684 | 29,658 | 39,723 |
| 1973 | 45,410 | 74,776 | 35,498 | 47,610 |
| 1974 | 58,014 | 118,095 | 42,878 | 61,865 |
| 1975 | 49,328 | 99,474 | 48,235 | 84,851 |
| 1976 | 55,089 | 130,859 | 65,884 | 122,387 |
| 1977 | 77,685 | 190,684 | 91,297 | 155,582 |
| 1978 | 106,451 | 230,128 | 110,655 | 210,548 |
| 1979 | 176,051 | 331,927 | 139,896 | 273,312 |
| 1980 | 231,623 | 475,486 | 192,868 | 364,740 |
| 1981 | 256,913 | 609,014 | 267,171 | 481,708 |
| 1982 | 331,743 | 756,981 | 323,628 | 582,141 |
| 1983 | 508,568 | 899,340 | 434,492 | 737,019 |
| 1984 | 760,580 | 1,160,633 | 511,125 | 913,642 |
| 1985 | 971,747 | 1,326,529 | 629,366 | 1,202,886 |

Annual gross domestic product at current market prices 10³ contos.

1938 13,692 data for the years 1947-1985 may be found in the text.

E - Margins of error

We tried to estimate the margins of error of our estimates of gross domestic product at current market prices, computing alternative estimates based on simple linear regressions on each of the proxy variables and comparing them with the estimates presented in the text. We accepted as estimates of the margin of error the maximum and minimum of the average of the ratios of the alternative estimates to the adopted figure of gross domestic product at current market prices.

These procedures led to the following results:

- a) Adjusted official data for the years 1947-1985: margin of error of -5% to +5%.
- b) Estimates based on the multiple double logarithmic regression on the proxy variables for the years 1865-1946: margin of error of -11% to +17%.
- c) Interpolated estimates for the years 1851-1864: margin of error of -8% to +26%.
- d) Interpolated and extrapolated estimates for the years 1833-1850: margin of error of -45% to +54%.

2. Computation of the deflator of gross domestic product

A - Methodology

Portuguese official national accounts data include estimates at constant 1954 prices for the years 1938 and 1947-1958, at constant 1963 prices for the years 1958-1976, and at previous year prices for the years 1977-1985. Filling the 1976-1977 gap with an estimate presented by the annual reports of the central bank (*Relatório do Banco de Portugal*, several issues), we obtained the series of the deflator of gross domestic product for the years 1938 and 1947-1985. As in the case of gross domestic product itself, we decided not to use the 1938 figure in our computations because its bad quality is widely recognised.

For the years 1833-1946, we computed an estimate of the deflator of gross domestic product at market current prices using the so-called index of the cost of living as a proxy variable for the deflator, and assuming that the elasticity of the deflator to this proxy variable in these years was the same as in the years 1947-1981. The index of the cost of living is a rough consumers price index published by the social security office (*Direcção-Geral da Previdência Social*) and by the statistical office for the years 1900-1981. We computed an estimate of this index of the cost of living for the years 1833-1899 using raw data from David Justino's doctoral thesis (*Justino, 1986*). Two other potential proxy variables for which data was available were not used. The decision not to use the wholesale price index for the years 1891-1931 presented in *Mata, 1987*, and the wholesale price index for the years 1833-1912 presented in *Justino, 1986* was taken because attempts to link them to

the price index implicit in official figures of gross domestic product through chain simple double logarithmic regressions gave poor results.

The simple double logarithmic regression of the price index implicit in official figures of gross domestic product at market current prices on the index of the cost of living with serial auto-correlation of the first order corrected by the Cochrane-Orcutt method gave the following results:

| | | | |
|------------------------------|--------|------------------------------|--------|
| Dependent variable | ln ipi | Independent variable | ln icl |
| Number of observations | 34 | Correlation coefficient | 0.997 |
| Determination coefficient | 0.994 | Adjusted determination coef. | 0.994 |
| Standard error | 0.030 | F-statistic | 5290 |
| Durbin-Watson statistic | 1.427 | Rho-parameter | 0.375 |
| Intercept term | -1.417 | Elasticity | 0.816 |
| Standard error of elasticity | 0.011 | T-statistic of elasticity | 72.7 |

where:

— ipi denotes the price index implicit in official figures of gross domestic product at current market prices;

— icl denotes the index of the cost of living.

An estimate of a deflator for gross domestic product at current market prices was computed using a formula based on the regression:

$$d = 2.332 \text{ icl}^{0.816}$$

where d denotes the estimate of a deflator for gross domestic product at current market prices, and the constant factor was computed to adjust the index to a 1914 basis.

The final series of a deflator for gross domestic product at current market prices was made using:

a) The above mentioned estimate of a deflator for gross domestic product at current market prices for the years 1833 to 1946.

b) The price index implicit in official figures of gross domestic product at market current prices for the years 1947-1985. This price index was multiplied by 24.674 to adjust it to the 1914 basis.

The deflator of gross domestic product was adjusted to a 1914 basis to avoid working with very small figures in the period before the first world war, and because such a basis makes some international comparisons easier as we shall see later.

B - Sources

— Surrogate index of the cost of living

Computed from data presented in *Justino, 1986*.

— Lisbon index of the cost of living

Costa, 1917.

— Index of the cost of living

Official data from *Anuário Estatístico* - Instituto Nacional de Estatística, Lisboa (several issues).

— Deflator implicit in official figures of gross domestic product

1938 and 1947-1980 - *Nunes, 1989* and *Contas nacionais* - Instituto Nacional de Estatística, Lisboa (several issues).

1981-1985 - *Contas nacionais* - Instituto Nacional de estatística, Lisboa (several issues).

C - Computation of the surrogate index of the cost of living.

Indexes for individual commodities presented by *Justino, 1986* were adjusted to a 1912 basis equal to 98 (the value of the Lisbon index of the cost of living for that year), and an overall index was computed using the weights of the index of the cost of living presented in *Costa, 1917.*

| Year | Surrogate index of the cost of living | Year | Surrogate index of the cost of living | Year | Surrogate index of the cost of living |
|------|---------------------------------------|------|---------------------------------------|------|---------------------------------------|
| 1833 | 46 | 1860 | 75 | 1887 | 70 |
| 1834 | 56 | 1861 | 80 | 1888 | 70 |
| 1835 | 70 | 1862 | 81 | 1889 | 76 |
| 1836 | 63 | 1863 | 77 | 1890 | 86 |
| 1837 | 49 | 1864 | 80 | 1891 | 83 |
| 1838 | 49 | 1865 | 77 | 1892 | 85 |
| 1839 | 51 | 1866 | 80 | 1893 | 87 |
| 1840 | 58 | 1867 | 86 | 1894 | 89 |
| 1841 | 61 | 1868 | 80 | 1895 | 84 |
| 1842 | 54 | 1869 | 79 | 1896 | 85 |
| 1843 | 50 | 1870 | 74 | 1897 | 92 |
| 1844 | 42 | 1871 | 72 | 1898 | 96 |
| 1845 | 42 | 1872 | 72 | 1899 | 94 |
| 1846 | 54 | 1873 | 95 | 1900 | 92 |
| 1847 | 51 | 1874 | 78 | 1901 | 87 |
| 1848 | 45 | 1875 | 79 | 1902 | 88 |
| 1849 | 48 | 1876 | 80 | 1903 | 97 |
| 1850 | 55 | 1877 | 91 | 1904 | 87 |
| 1851 | 50 | 1878 | 90 | 1905 | 81 |
| 1852 | 49 | 1879 | 86 | 1906 | 82 |

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| Year | Surrogate index of the cost of living | Year | Surrogate index of the cost of living | Year | Surrogate index of the cost of living |
|------|---------------------------------------|------|---------------------------------------|------|---------------------------------------|
| 1853 | 62 | 1880 | 80 | 1907 | 91 |
| 1854 | 76 | 1881 | 82 | 1908 | 90 |
| 1855 | 74 | 1882 | 83 | 1909 | 89 |
| 1856 | 93 | 1883 | 79 | 1910 | 92 |
| 1857 | 77 | 1884 | 73 | 1911 | 97 |
| 1858 | 70 | 1885 | 70 | 1912 | 98 |
| 1859 | 78 | 1886 | 72 | | |

| Year | Lisbon index of the cost of living | Year | Lisbon index of the cost of living | Year | Lisbon index of the cost of living |
|------|------------------------------------|------|------------------------------------|------|------------------------------------|
| 1900 | 91 | 1906 | 95 | 1912 | 98 |
| 1901 | 90 | 1907 | 95 | 1913 | 101 |
| 1902 | 87 | 1908 | 96 | 1914 | 100 |
| 1903 | 90 | 1909 | 97 | 1915 | 112 |
| 1904 | 96 | 1910 | 93 | 1916 | 137 |
| 1905 | 95 | 1911 | 99 | | |

| Year | Index of the cost of living | Year | Index of the cost of living | Year | Index of the cost of living |
|------|-----------------------------|------|-----------------------------|------|-----------------------------|
| 1914 | 100 | 1937 | 2,102 | 1960 | 4,472 |
| 1915 | 112 | 1938 | 2,037 | 1961 | 4,461 |
| 1916 | 137 | 1939 | 1,918 | 1962 | 4,459 |
| 1917 | 162 | 1940 | 2,009 | 1963 | 4,575 |
| 1918 | 293 | 1941 | 2,258 | 1964 | 4,799 |
| 1919 | 335 | 1942 | 2,758 | 1965 | 4,955 |
| 1920 | 580 | 1943 | 3,118 | 1966 | 5,081 |
| 1921 | 909 | 1944 | 3,208 | 1967 | 5,293 |
| 1922 | 1,099 | 1945 | 3,497 | 1968 | 5,398 |
| 1923 | 1,726 | 1946 | 3,980 | 1969 | 5,543 |
| 1924 | 2,399 | 1947 | 4,103 | 1970 | 5,822 |
| 1925 | 2,306 | 1948 | 3,381 | 1971 | 6,253 |
| 1926 | 2,208 | 1949 | 3,920 | 1972 | 6,778 |
| 1927 | 2,371 | 1950 | 3,819 | 1973 | 7,299 |
| 1928 | 2,269 | 1951 | 3,872 | 1974 | 10,064 |
| 1929 | 2,361 | 1952 | 3,878 | 1975 | 11,929 |
| 1930 | 2,243 | 1953 | 3,913 | 1976 | 14,391 |
| 1931 | 1,990 | 1954 | 3,944 | 1977 | 19,136 |
| 1932 | 1,949 | 1955 | 4,077 | 1978 | 24,257 |
| 1933 | 1,948 | 1956 | 4,256 | 1979 | 30,103 |
| 1934 | 1,968 | 1957 | 4,257 | 1980 | 35,641 |
| 1935 | 1,972 | 1958 | 4,318 | 1981 | 41,372 |
| 1936 | 2,022 | 1959 | 4,375 | | |

| Year | Price index implicit in gross domestic product data | Year | Price index implicit in gross domestic product data | Year | Price index implicit in gross domestic product data |
|------|---|------|---|------|---|
| 1938 | 38 | 1959 | 94 | 1973 | 156 |
| — | — | 1960 | 96 | 1974 | 185 |
| 1947 | 84 | 1961 | 98 | 1975 | 215 |
| 1948 | 83 | 1962 | 98 | 1976 | 249 |
| 1949 | 87 | 1963 | 100 | 1977 | 312 |
| 1950 | 85 | 1964 | 102 | 1978 | 380 |
| 1951 | 89 | 1965 | 106 | 1979 | 449 |
| 1952 | 91 | 1966 | 111 | 1980 | 548 |
| 1953 | 89 | 1967 | 115 | 1981 | 647 |
| 1954 | 87 | 1968 | 116 | 1982 | 781 |
| 1955 | 89 | 1969 | 123 | 1983 | 974 |
| 1956 | 92 | 1970 | 127 | 1984 | 1,214 |
| 1957 | 92 | 1971 | 133 | 1985 | 1,474 |
| 1958 | 93 | 1972 | 143 | | |

E - Margins of error

The margins of error of the deflator of gross domestic product at current market prices are impossible to estimate because we lack reliable alternative estimates. We decided rather arbitrarily to assume the deflator of gross domestic product at current market prices to have the same margins of error we computed for the figures of gross domestic product for the same years.

3. Computation of population

A - Methodology

The first official estimate of the population of Portugal dates from 1820. This kind of estimate was repeated in 1841, 1854, 1857, 1858, 1861 and 1862. To produce a year to year estimate of the population at the end of the year, unknown reference dates were supposed to be the 1st January, that is to say the end of the previous year, and estimates for intermediate years (1833-1839, 1841-1852, 1854, 1855, 1858, 1859 and 1862) were made by exponential interpolation.

The first three Portuguese population censuses took place on the 1st January 1864, on the 1st January 1878, and on the 1st December 1890. A year to year estimate of the population at the end of the year, for the years 1864-1889 was made by exponential interpolation of the results of these censuses.

From 1886 on, yearly vital and emigration statistics are available. In her doctoral thesis (Nunes, 1989), Ana Bela Nunes used this data and the results of population censuses to make year-to-year estimates of the population at the end of the year for the years 1890-1980. We have adopted these estimates here, with minor computation corrections, except for the 1970's. We made a new estimate for this decade based on different assumptions about external migrations. We separated current net emigration and the arrivals of residents from the Portuguese African colonies. As far as current net emigration is concerned we assumed its ratio to legal emigration to be the same as in the 1960's. With regard to the arrivals of residents from the Portuguese African colonies we assumed their total to be equal to the value of the following expression;

arrivals = population at 1981 census - population at 1970 census - live births between censuses + deaths between censuses + current net emigration between censuses;

and their time distribution to be one third in 1974, one half in 1975 and one sixth in 1976.

Population for the years 1981-1985 is an official estimate of the statistical office.

B - Sources

1820-1890 - *Recenseamento Geral da População*, published by the Direcção-Geral de Estatística (several issues), and *Serrão, 1973*.

1890-1981 - *Recenseamento Geral da População* and *Anuário Estatístico*, published by the Direcção-Geral de Estatística or by the Instituto Nacional de Estatística (several issues), and *Nunes, 1989*.

1981-1985 - *Anuário Estatístico*, published by the Instituto Nacional de Estatística (several issues).

C - Data 1820-1890

| Year | Population 10 ³ inhabitants | Year | Population 10 ³ inhabitants | Reference date |
|------|---|------|---|-------------------|
| 1820 | 3,297 | 1864 | 4,188 | 1st January |
| 1841 | 3,737 | 1878 | 4,551 | 1st January |
| 1854 | 3,844 | 1890 | 5,103 | 1st December |
| 1857 | 3,909 | | | |
| 1858 | 3,923 | | | |
| 1861 | 4,035 | | | |
| 1862 | 4,110 | | | |

D - Data 1890-1981

| Year | Live births 10 ³ people | Deaths 10 ³ people | Net immigration (+) net emigration (-) 10 ³ people | Population 10 ³ people |
|---------|---------------------------------------|----------------------------------|---|--------------------------------------|
| 1890(a) | 14 | 11 | - 1 | 5,105 |
| 1891 | 162 | 116 | - 13 | 5,138 |
| 1892 | 159 | 104 | - 12 | 5,182 |
| 1893 | 164 | 110 | - 17 | 5,220 |
| 1894 | 154 | 107 | - 15 | 5,251 |
| 1895 | 156 | 108 | - 25 | 5,275 |
| 1896 | 158 | 120 | - 15 | 5,297 |
| 1897 | 161 | 116 | - 12 | 5,331 |
| 1898 | 161 | 114 | - 13 | 5,365 |
| 1899 | 161 | 108 | - 10 | 5,407 |
| 1900 | 165 | 110 | - 12 | 5,450 |
| 1901 | 171 | 114 | - 10 | 5,497 |
| 1902 | 176 | 108 | - 12 | 5,552 |
| 1903 | 183 | 112 | - 11 | 5,613 |
| 1904 | 177 | 106 | - 14 | 5,670 |
| 1905 | 180 | 113 | - 17 | 5,720 |
| 1906 | 183 | 125 | - 19 | 5,758 |
| 1907 | 176 | 113 | - 21 | 5,800 |
| 1908 | 175 | 116 | - 20 | 5,840 |
| 1909 | 175 | 112 | - 19 | 5,883 |
| 1910 | 187 | 113 | - 20 | 5,937 |
| 1911 | 230 | 131 | - 31 | 6,004 |
| 1912 | 208 | 120 | - 85 | 6,008 |
| 1913 | 194 | 123 | - 74 | 6,004 |
| 1914 | 188 | 116 | - 25 | 6,053 |
| 1915 | 195 | 123 | - 19 | 6,107 |
| 1916 | 193 | 129 | - 24 | 6,147 |
| 1917 | 188 | 134 | - 15 | 6,186 |
| 1918 | 179 | 249 | - 11 | 6,104 |
| 1919 | 166 | 153 | - 35 | 6,082 |
| 1920 | 203 | 143 | - 58 | 6,084 |
| 1921 | 197 | 126 | - 7 | 6,148 |
| 1922 | 204 | 126 | - 11 | 6,216 |
| 1923 | 207 | 142 | - 10 | 6,271 |
| 1924 | 207 | 126 | - 8 | 6,344 |
| 1925 | 208 | 117 | - 6 | 6,429 |
| 1926 | 217 | 128 | - 11 | 6,507 |
| 1927 | 203 | 123 | - 7 | 6,580 |
| 1928 | 211 | 124 | - 9 | 6,658 |
| 1929 | 201 | 119 | - 11 | 6,729 |
| 1930 | 203 | 117 | - 3 | 6,812 |
| 1931 | 204 | 115 | + 6 | 6,908 |
| 1932 | 208 | 119 | + 6 | 7,003 |

| Year | Live births 10 ³ people | Deaths 10 ³ people | Net immigration (+) net emigration (-) 10 ³ people | Population 10 ³ people |
|------|---------------------------------------|----------------------------------|---|--------------------------------------|
| 1933 | 204 | 121 | + 10 | 7,096 |
| 1934 | 203 | 119 | + 8 | 7,189 |
| 1935 | 204 | 123 | + 10 | 7,279 |
| 1936 | 206 | 119 | + 13 | 7,379 |
| 1937 | 198 | 117 | + 16 | 7,476 |
| 1938 | 199 | 115 | + 14 | 7,575 |
| 1939 | 199 | 116 | + 19 | 7,677 |
| 1940 | 188 | 120 | + 13 | 7,758 |
| 1941 | 184 | 135 | - 7 | 7,800 |
| 1942 | 188 | 127 | - 2 | 7,859 |
| 1943 | 198 | 122 | - 1 | 7,934 |
| 1944 | 201 | 119 | - 3 | 8,013 |
| 1945 | 209 | 116 | - 6 | 8,101 |
| 1946 | 206 | 121 | - 4 | 8,182 |
| 1947 | 200 | 110 | - 14 | 8,258 |
| 1948 | 221 | 108 | - 13 | 8,358 |
| 1949 | 212 | 117 | - 19 | 8,434 |
| 1950 | 205 | 103 | - 25 | 8,512 |
| 1951 | 208 | 105 | - 68 | 8,547 |
| 1952 | 211 | 100 | - 95 | 8,563 |
| 1953 | 202 | 97 | - 80 | 8,587 |
| 1954 | 198 | 95 | - 83 | 8,607 |
| 1955 | 210 | 99 | - 60 | 8,657 |
| 1956 | 203 | 107 | - 54 | 8,698 |
| 1957 | 211 | 102 | - 71 | 8,737 |
| 1958 | 212 | 92 | - 69 | 8,789 |
| 1959 | 213 | 98 | - 67 | 8,837 |
| 1960 | 214 | 95 | - 65 | 8,891 |
| 1961 | 218 | 100 | - 65 | 8,944 |
| 1962 | 220 | 97 | - 65 | 9,002 |
| 1963 | 212 | 98 | - 77 | 9,040 |
| 1964 | 217 | 97 | -107 | 9,053 |
| 1965 | 210 | 95 | -172 | 8,996 |
| 1966 | 207 | 100 | -232 | 8,871 |
| 1967 | 202 | 96 | -179 | 8,798 |
| 1968 | 195 | 95 | -155 | 8,743 |
| 1969 | 190 | 101 | -135 | 8,696 |
| 1970 | 173 | 93 | -128 | 8,648 |
| 1971 | 189 | 98 | - 97 | 8,642 |
| 1972 | 175 | 90 | -104 | 8,622 |
| 1973 | 172 | 95 | -154 | 8,545 |
| 1974 | 172 | 97 | +271 | 8,891 |
| 1975 | 180 | 98 | +484 | 9,457 |
| 1976 | 187 | 102 | +143 | 9,685 |
| 1977 | 181 | 96 | - 33 | 9,737 |

| Year | Live births 10 ³ people | Deaths 10 ³ people | Net immigration (+) net emigration (-) 10 ³ people | Population 10 ³ people |
|---------|---------------------------------------|----------------------------------|---|--------------------------------------|
| 1978 | 167 | 96 | - 36 | 9,772 |
| 1979 | 160 | 93 | - 40 | 9,800 |
| 1980 | 161 | 98 | - 35 | 9,828 |
| 1981(b) | 32 | 20 | - 7 | 9,833 |

(a) Data for 1890 refers only to the period between the census (1st December) and the end of the year.

(b) Data for 1981 refers only to the period between the beginning of the year and the census (15th March).

E - Margins of error

We tried to estimate the margins of error of the population figures for the years 1890-1985, computing the average of the ratios of the algebraic sum of live births, deaths and legal emigration in the inter-censuses periods to the results of the censuses. This procedure led to a figure of $\pm 3.5\%$.

The margins of error of the population figures for the years 1833-1890 are impossible to estimate, because we lack alternative data. We may perhaps assume the margins of error of the population figures for these years not to be larger than $\pm 7\%$, according to general comments that precede the presentation of the counts and censuses.

4. Computation of gross domestic product at 1914 market prices, and per capita gross domestic product

Gross domestic product at 1914 market prices was computed as the ratio of gross domestic product at current market prices to its deflator.

Per capita gross domestic product at 1914 market prices was computed as the ratio of gross domestic product at factor cost and constant prices to population.

5. A note on Portuguese monetary units

At the beginning of the period under consideration, the Portuguese monetary regime was based on bimetallism. A law of the 6th March 1822 implicitly defined the monetary unit (the *real*, plural *réis*) as 1.734 mg of gold and 27.745 mg of silver — the par was then £ 1 = 4,225 *réis*. The silver definition of the *real* was changed by a law of the 24th April 1835 to 26.850 mg.

A decree of the 13th March 1847 changed the gold value of the *real* to 1.626 mg — the par became £ 1 = 4,500 *réis*. Such a definition was maintained when the law of the 29th July 1854 adopted gold monometallism (the classical gold-standard) as the new monetary regime of the country.

The gold-standard was dropped *de facto* (though not *de jure*) by the law of the 9th July 1891 that suspended *sine die* the convertibility of bank notes (and gave the monopoly of its emission to the Bank of Portugal). A law of the 22nd May 1911 replaced the *real* by the *escudo* equal to 1,000 *réis* as the monetary unit. The gold-standard was, however, maintained *de jure* and the new unit was defined as 1.626 g of gold.

A decree of the 9th June 1931 tried to link Portugal to the gold-exchange standard, and replaced the definition of the *escudo* which became 65.51 mg of gold. In practice, the *escudo* was pegged to sterling at the ratio £ 1 = 110 *escudos* until 1940, and then to the dollar at the ratio \$ 1 = 25 *escudos*, later modified to \$ 1 = 28.75 *escudos*, until 1971. From that year on, depreciation was the main trend, and the *de jure* gold definition of the *escudo* was formally dropped in 1975.

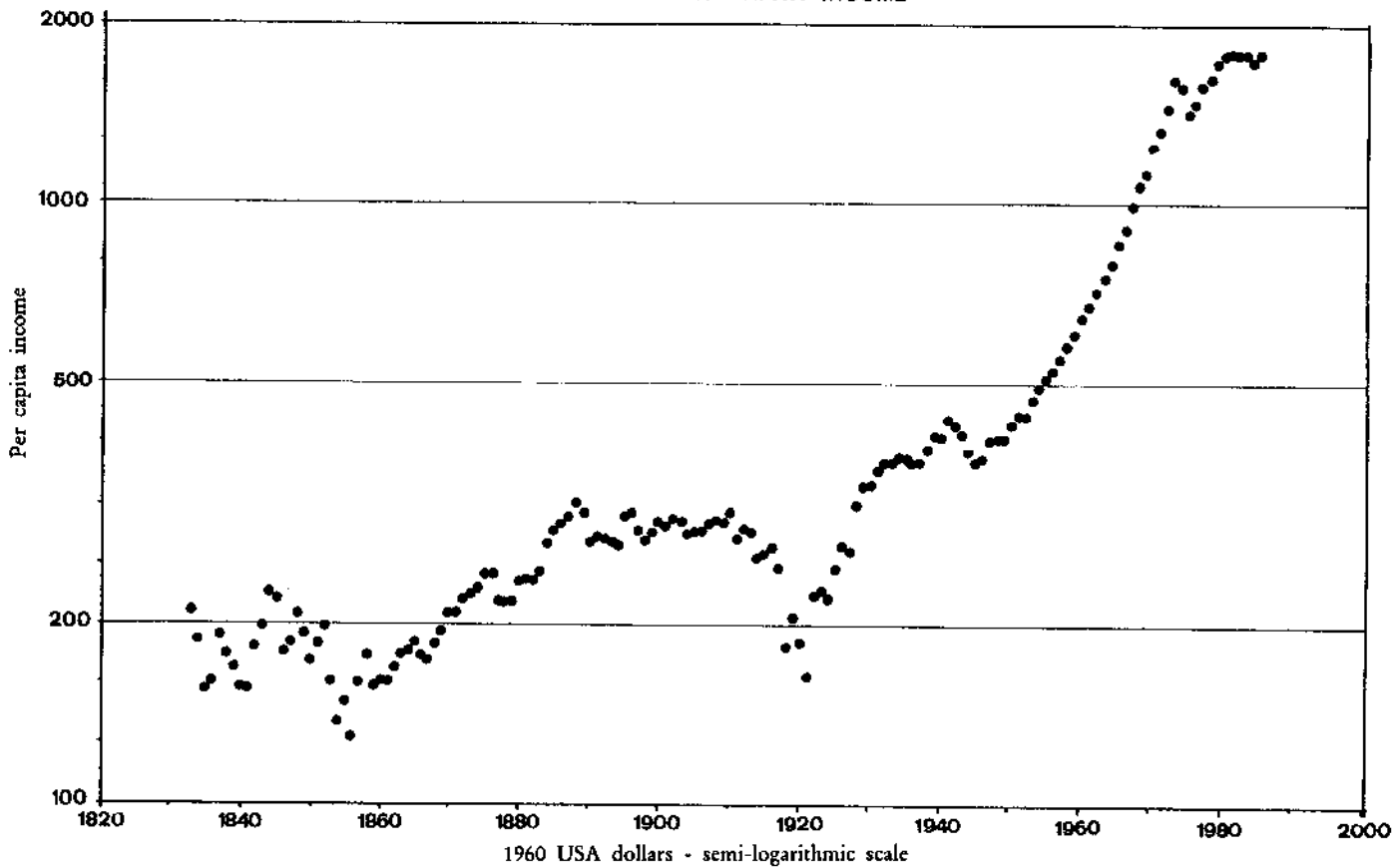
Throughout the period, the *conto* was an accounting unit of one million *réis* or one thousand *escudos*.

6. Conversion to 1960 USA dollars

Conversion of figures expressed in 1914 *escudos* to figures expressed in 1960 dollars at an exchange rate parity, may be done by multiplication by a factor of 0.824, that corresponds to the ratio of the 1960 Portuguese price index with a 1914 basis (23.69) to the 1960 dollar *escudo* exchange rate (28.75).

To adjust this conversion to a purchasing power parity the conversion factor must be multiplied by a new factor of 2.197 that corresponds to the inverse of the Portuguese 1960 price index with a 1960 American basis (45.52% according to Summers, Heston, 1988). This leads to a factor of 1.810 for the direct conversion at a purchasing power parity.

PORTUGUESE PER CAPITA INCOME



Portuguese Economic Growth 1833-1985

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