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NEW GNP ESTIMATES FOR THE BELGIAN ECONOMY DURING THE INTERWAR PERIOD

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New GNP estimates in current and constant prices for the Belgian economy in the interwar period are presented. The series are conceptually and methodologically consistent with the post-World War II data and cover both the income and expenditure approaches. The new estimates differ considerably from the data that have been published before, casting new light on our present understanding of Belgian economic growth in the 1920s and 1930s.

1. INTRODUCTION

In the past fifteen years or so economic research concerning the interwar period has flourished. Since the 1970s the world economy has been facing problems which resemble in several respects those of the 1920s and 1930s. The debt crisis of the developing countries, large imbalances in international trade, instability of financial markets and high unemployment rates all suggest parallels with the interwar period. In the Belgian case, however, comparative research on macro-economic developments in the interwar and post-1975 periods has been thwarted by the lack of reliable historical national accounts. It is the aim of this paper to present GNP estimates for the 1920s and 1930s, both in current and constant prices, which are conceptually and methodologically consistent with the post-World War II data. Although only the income and expenditure approaches have been completed, the new series constitute a great leap forward in our knowledge of the Belgian economy during the interbellum.

First, a critical evaluation of previous national income estimates by F. Baudhuin, C. Carbonnelle, and A. Maddison is presented. Second, I provide a summary description of the methods used to arrive at the new interwar series in current prices. Finally, the reconstruction of constant price GNP figures is explained.

2. PREVIOUS ESTIMATES FOR THE INTERWAR PERIOD

2.1. *The National Income Estimates of F. Baudhuin*

F. Baudhuin, a professor at the University of Louvain during the interwar period, was the first to produce national income estimates for Belgium on a more

Note: This article summarizes the work of many researchers, each of them in charge of one component or another of Belgian interwar GNP: J. Blomme, P. Clement, M. Goossens, P. Nackaerts, S. Peeters, G. Pepermans, C. Schroeven, A. Soete and M. A. van Meerten. The author gratefully acknowledges the stimulating comments of P. Solar.

List of abbreviations: BNB: Banque Nationale de Belgique; DULBEA: Département d'Economie Appliqué de l'Université Libre de Bruxelles; NBB: National Bank of Belgium; NIS: National Institute for Statistics.

or less regular basis. Unfortunately, his calculations—published at various times—cover only the years 1924, 1927, 1930, 1932 and 1934–38.[1] Moreover, his estimates are insufficiently detailed. The 1924 and 1932 national income estimates, for instance, are subdivided into merely four categories: income from paid employment, entrepreneurial income, capital income from real estate and other capital income. Besides being incomplete and highly aggregated, the Baudhuin series also suffer from certain conceptual and methodological deficiencies.

As common to most economists working on national accounting during the interwar period, Baudhuin developed his own national income definition. It is something close to the present concept of *net national product at factor cost*. The Baudhuin definition differs from net national product at factor cost by not taking into consideration the following SNA categories: employers' social security contributions, direct taxation of companies, income from property and entrepreneurial income accruing to the government, and interest on the public debt. Moreover, as Baudhuin did not estimate depreciation allowances, indirect taxes or subsidies, it is not possible to compile a proxy of GNP at market prices.

The Baudhuin series are also afflicted by some methodological shortcomings, the most important of which are related to the extensive use of fiscal statistics. First, the adjustments for under-registration and other defects are extremely *ad hoc*. For example, the extrapolation coefficient used to correct the declared figures for entrepreneurial income falls from 33 percent in 1924 to 15 percent in 1927. Baudhuin never explained this substantial reduction.

A second criticism involves the way Baudhuin, as a contemporary observer, incorporated the fiscal statistics in his estimation procedure. Since the fiscal data were published with much delay, he often had to use fiscal statistics from earlier years as the starting point for his national income estimates. In most cases he revised these figures as soon as the fiscal statistics of the relevant year became available. The national income of 1930, however, was never recalculated and should therefore be considered as a forecast and not as an estimate in the proper sense of the word.[2] The same is true, albeit to a somewhat lesser extent, for the 1924 and 1932 national income figures.[3] A third critique is that Baudhuin confined himself to the income approach, so that he never really tested the validity of his national income estimates.[4] Finally, Baudhuin's data are available only in *nominal* prices as he never calculated an appropriate price deflator. In view of the turbulent behaviour of prices in interwar Belgium this is a serious obstacle in evaluating the country's relative growth performance.

Table 1 compares the Baudhuin series with the new national income estimates adjusted to Baudhuin's concept. Between 1924 and 1935 the Baudhuin figures are approximately 10 percent below the new data. This result is not surprising as

[1]For an overview of his publications concerning national income figures, see Van der Aa (1946, pp. 1124–25).

[2]Based on extrapolations from the fiscal statistics of 1926–28 (Baudhuin, 1930, pp. 375–376).

[3]The 1924 national income estimate is largely based on extrapolations from the fiscal statistics of 1922. In the case of entrepreneurial income the author first estimated the declared income in 1924 and subsequently addressed the problem of fiscal under-estimation (Baudhuin, 1927, pp. 54–55).

[4]A very crude estimate of private consumption in 1924, 1930 and 1938 was presented successively in Baudhuin (1926, p. 60; 1931, p. 133 and 1953, p. 347).

TABLE 1

BAUDHUIN'S NATIONAL INCOME FIGURES COMPARED WITH THE NEW (ADJUSTED) ESTIMATES (IN CURRENT PRICES)

	Baudhuin's Estimate (in million BF)	New Estimate (in million BF)	Percentage Difference
	(1)	(2)	(3)
1924	31,250	36,120	13.5
1927	48,610	54,710	11.2
1930	68,490	74,250	7.8
1932	50,000	58,650	14.8
1934	49,710	54,900	9.4
1935	50,700	55,220	8.2
1936	59,770	59,730	−0.1
1937	65,270	66,620	2.0
1938	65,200	67,940	4.0

Source: (1) Baudhuin (1947, p. 494). (2) Calculated from Peeters *et al.* (forthcoming), Annex 1.

Baudhuin always stressed that his figures represented a lower bound estimate.[5] In 1936, however, the two series converge suddenly. How can the sharp rise in Baudhuin's national income figures between 1935 and 1936 be explained? Baudhuin's position in the debate on Belgian monetary policy in 1934–35 may be important.[6] At that time he was a strong advocate of a devaluation of the Belgian franc in order to push the Belgian economy out of the Great Depression. So, when the devaluation of the franc finally took place in March 1935, it was to his advantage to emphasize as much as possible the beneficial economic effects of this measure.

2.2. *The Gross Domestic Product Estimates of C. Carbonnelle*

In the late 1950s C. Carbonnelle (DULBEA, University of Brussels) tried to remedy some of the deficiencies of the Baudhuin series.[7] He constructed an index based on sectoral production indexes that shows the annual movement of Belgian GDP (factor cost) at constant prices between 1920 and 1938.[8] Carbonnelle converted figures per branch of industry into a global index by using as weights the sectoral shares of value added in 1953.[9] The choice of the base year was determined by the availability of the first input–output table for the Belgian economy.

Unfortunately, Carbonnelle's figures were published on a highly aggregated level. Separate production indexes are available only for agriculture, energy, heavy

[5]For example Baudhuin (1926, p. 125).

[6]For more details, see Van der Wee and Tavernier (1975, pp. 272–89).

[7]DULBEA played an important role in the genesis of the official Belgian national accounts in the 1950s and early 1960s (Van der Wee and Dancet, 1986, pp. 152–54).

[8]In the same article he also presented estimates for the 1900–13 and the 1948–57 period.

[9]Sadly, these calculations were not always done properly. In the case of construction, for instance, no data were available prior to 1930, so Carbonnelle (1959) gave the series a value of zero between 1920 and 1929. Nevertheless, the series was used in the computation of the global index.

industry, construction, other manufacturing, total manufacturing and transport. Moreover, his procedures have several methodological problems. Firstly, the use of fixed weights ignores changes in relative prices. Since the global index covers more than 30 years of extremely volatile price movements this procedure can generate serious disturbances. Secondly, the sectoral production indexes refer to the weight of output, so that quality changes are not taken into account. Thirdly, the method used assumes that in every sector production and value added move in parallel, yet it is clear that in the long run technological change can substantially alter the input–output ratios in a production process. Carbonnelle was well aware of these shortcomings but made no effort to correct them, noting only that the constructed series probably under-estimated Belgian economic growth to a limited extent.

An even more important methodological deficiency is related to the way Carbonnelle treated most of the service sector (more than 40 percent of GDP at factor cost in 1953). He assumed that value added in services at constant prices (transport excluded) ran parallel to the total production index of agriculture, manufacturing and transport. This is a dangerous assumption as the manufacturing sector is far more sensitive to business cycle fluctuations than the service sector. The treatment of services explains to a large extent the divergences shown in Figure 1 between the Carbonnelle figures and the new estimates. Carbonnelle's series clearly accentuates the boom period of the late 1920s and the subsequent decline in economic activity. Another striking difference concerns the cyclical turning point: 1928 according to Carbonnelle, 1930 according to the new series. Again, the difference is largely explained by Carbonnelle's neglect of the dynamics of the service sector. The internationally oriented manufacturing sector was already feeling the adverse effect of declining exports in 1929–30. The domestic sector, by contrast, continued to expand until 1930, a development which undoubtedly favoured the service sector.

2.3. *The Gross Domestic Product Estimates of A. Maddison*

More recently, A. Maddison produced long-run estimates of Belgian GDP. For the interwar period, he used Carbonnelle's data to calculate commodity production. Value added in services was computed by interpolating Carbonnelle's benchmark estimates of total GDP in 1910, 1930 and 1948 (Maddison, 1991, p. 202). As Maddison's figures explicitly take the service sector into account, his series more smoothly evolves than Carbonnelle's data (see Appendix, Table 5). Nevertheless, Maddison's annual estimates of GDP still depend heavily on Carbonnelle's total production index of agriculture, manufacturing and transport, so that most of the criticism mentioned above remains valid.

3. The New Estimates in Current Prices

In the new GNP estimates for the interwar period, the concepts and methods that are in current use have been employed in so far as possible. Successively I shall present the income approach, the expenditure approach and the compromise estimate.

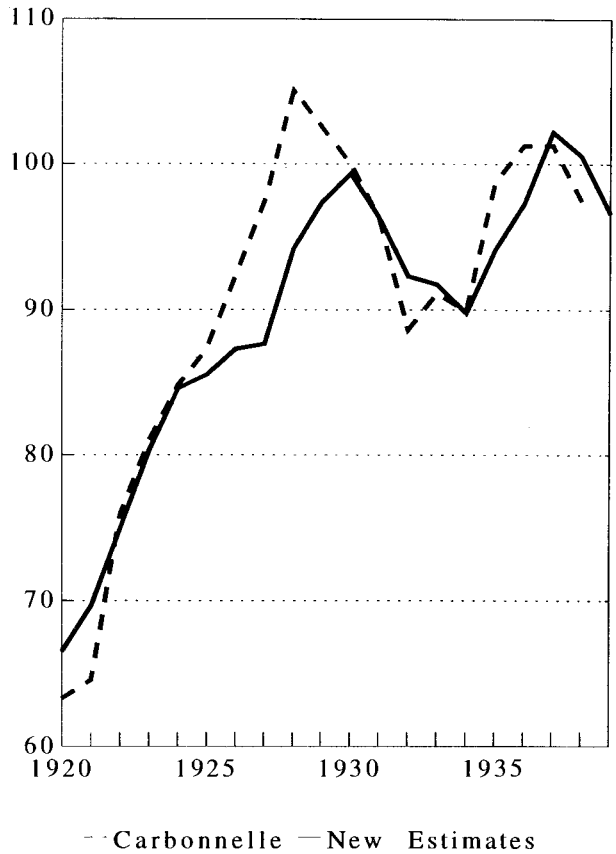

Figure 1. Carbonnelle's Series Compared with New Estimates, 1920–39 (GDP at Constant Prices, 1936–38 = 100)

Source: Calculated from Appendix, Table 5

3.1. *Income Approach*[10]

Income from Wages

As in the present methodology of the Belgian National Institute for Statistics (NIS) the reconstruction of *blue-collar* workers' pay was based on social security data. More specifically, Peeters *et al.* (forthcoming) used the wage bill in the reports on insurance against industrial accidents as a starting point. In principle, the insured wage bill covers all variables that determine the total wage paid: the number of employees, the hourly wage, premiums if any, and the number of hours worked (overtime included). In order to allow for non-declared earnings, non-insured workers, etc. some adjustments were necessary to convert the insured wage bill into the actually earned wage bill. Finally, the pay of domestic servants, border-workers and seasonal workers employed abroad was estimated separately.

[10]For more information, see Peeters *et al.* (forthcoming).

Given that many *white-collar* workers were not required to be insured, Peeters *et al.* (forthcoming) estimated the annual pay of employees indirectly. Annual series were constructed by multiplying employment by the average salary of an employee. This procedure does not take into account the number of working hours, but most white-collar workers were paid monthly regardless of the number of hours worked.

The employment of white-collar workers was calculated from the censuses of industry and/or population in 1910, 1920, 1926, 1930 and 1937. Peeters *et al.* (forthcoming) interpolated the intervening years on the basis of labour force estimates and unemployment figures.[11] Information on the average gross salary was found in an extensive pay survey organized within the framework of the 1937 census of industry. As no macroeconomic index of white-collar salaries is available for the other years, the average pay of white-collar workers in 1937 was linked to an hourly wage index of skilled blue-collar workers in manufacturing and an index of the annual pay of railway employees.

The estimates of *employers' social security contributions* have to take into account that in the interwar period Belgium moved from a voluntary to a compulsory system in several branches of social security. By the early 1930s employers had to pay social security contributions for family allowances, industrial accidents, occupational illness and pensions. The data were found in publications from official bodies.[12]

In the heading *pay and pensions of government staff* a distinction was made between central government, provincial and local authorities, subsidized education and some public corporations (National Railways, Postal Services, . . .). The figures were based on a detailed analysis of the Accounts of the Audit Office,[13] the Parliamentary Documents of the Chamber and Senate, the Statistical Yearbook of Belgium, and other official publications.[14]

Entrepreneurial Income

This category comprises all earnings of self-employed persons or partnerships resulting from the economic activity of the enterprises they own. Entrepreneurial income consists of two components, which are difficult to separate from each other: (a) the remuneration for the entrepreneur's labour and the non-salaried members of his family, and (b) the return on the entrepreneur's capital.

As in the present national accounts, entrepreneurial income of *independent traders, craftsmen and the professions* was calculated from fiscal statistics. By the

[11]In the census years the number of white-collar workers employed was increased by the number of unemployed white-collar workers to arrive at the total labour force of employees. For the intervening years the white-collar labour force was interpolated linearly. Subsequently, Peeters *et al.* estimated annual unemployment levels. Finally, employment data could be obtained by multiplying the labour force by one minus the level of unemployment.

[12]It is important to point out that premiums paid *voluntarily* by employers, for instance to secure an additional pension for his staff, are classified under the heading salaries and wages.

[13]In the Belgian legislative framework the Audit Office is an official body that on authority of Parliament examines the execution of the budget. After the conclusion of a financial year the Audit Office thoroughly verifies all revenues and expenditures actually performed. Consequently, the data mentioned in the Accounts of the Audit Office are preferable to those included in the original budgets, which reflect only projected revenues and expenditure.

[14]For more details, see Clement (1995, pp. 41–59).

conversion of declared income to actual earnings, changes in tax legislation, tax monitoring and economic climate were taken into account. For the years in which no fiscal statistics are available (1921, 1923, 1925–26, 1931, 1933–34 and 1936–39), interpolations and extrapolations were made on the basis of consumption data for some relevant goods and services.

Fiscal statistics are not very useful in estimating entrepreneurial income from *agriculture, horticulture and forestry* because farmers and market gardeners were subject to a lump sum tax. For this reason net income in agriculture was calculated by deducting the estimated value of inputs from the estimated value of gross output.[15] For the interwar period, no data are available to compute entrepreneurial income of *partnerships*. Based on post World War II data Peeters *et al.* (forthcoming) assumed that income of partnerships averaged 7 percent of entrepreneurial income of independent traders and craftsmen.

Capital Income

For several sub-categories the sources at our disposal (reports from financial institutions or from official bodies monitoring the various segments of the Belgian financial system) do not permit direct estimates of *interest payments to the personal sector*. In these cases Peeters *et al.* (forthcoming) calculated the total level of outstanding debt, to which an average rate of interest was then applied. In some instances it was only possible to compute *total* interest payments, so that post-World War II ratios had to be used to determine the share accruing to the personal sector.

The amount of *rents (received or imputed) payable to individuals* was estimated in various stages. On the basis of Land Registry documents Buyst (1994, pp. 20–21) calculated the average gross rent of built-on property in 1935. This figure was then linked to a rent index and multiplied by an annual series for the number of households. The charges to be deducted from gross rent consist of depreciation allowances, maintenance costs and interest charges on mortgages. Depreciation was computed from capital stock data using a straight-line depreciation method and assuming that the expected life of residential dwellings was 150 years.[16] Maintenance costs in 1930 were estimated at 15 percent of gross rent. For the remaining years the 1930 figure was linked to an index of wages and material prices in the building industry. Finally, interest charges on mortgages were calculated along similar lines as explained under the heading "interest payments to the personal sector."

Estimates of *dividends accruing to private individuals* were based on two sources: (a) return-on-capital statistics for Belgian and Congolese joint-stock companies compiled by the National Bank of Belgium (BNB, 1929, pp. 19–22; NBB, 1946, pp. 160–187) and (b) fiscal data relating to income subject to the financial assets tax. Peeters *et al.* (forthcoming) calculated *retained profits* of joint-stock companies from return-on-capital statistics of the National Bank of Belgium by deducting distributed profits from total net profits. Undistributed profits of public

[15]For more information, see Blomme (1993, pp. 37–193).

[16]An expected life of residential dwellings of 150 years is a very long period of time compared to international conventions (60 to 80 years). The NIS, however, uses an average life of 180 years for its post-World War II estimates. For more details, see Buyst (1994, p. 31).

corporations were taken from the annual reports of the most important companies.

For the category *direct taxation of companies* only rough estimates are available as published tax data did not distinguish between the personal sector and corporations. In most cases post-World War II ratios were employed to calculate the share of companies in each form of taxation.

Income from property accruing to the government was estimated from values provided by the 1935 Inventory of State Property. Figures for other years were derived from investment data and depreciation allowances.[17] Following the NIS methodology, imputed net rent was set at 3.5 percent of the property's annual value. *Entrepreneurial income accruing to the government* covers dividends, interest and other earnings as compensation for invested capital. The estimates were based on the Accounts of the Audit Office (central government), the *Statistical Yearbook of Belgium* (provincial and local authorities) and annual reports of the General Savings and Annuity Fund (interest on actuarial reserves of statutory pension funds and of industrial accidents insurance funds).

Interest on the public debt of the central government was calculated from NBB (1946, pp. 151–152) and Michiels (1983, p. 32). Some adjustments were necessary to include interest payments on inter-governmental debt and to take into account the effect of exchange rate fluctuations on interest payments due in foreign currency. Interest payments on local government debt were derived from NBB (1946, p. 159) and the *Statistical Yearbook of Belgium*.

It is important to point out that the NIS concept of *indirect taxes*, contrary to the SNA conventions, does not include real estate taxes, which it considers as direct taxes. Peeters used the NIS concept for his interwar estimates in order to remain consistent with post-1953 data. Tax receipts were calculated from the Accounts of the Audit Office and Vandendriessche (1977). The same sources were used to compute the amount of *subsidies* paid out to producers.

The methods used to estimate *depreciation* of dwellings and of public buildings have been explained above. In the case of plant and equipment Peeters *et al.* (forthcoming) followed a different procedure. They assumed that the 1947 capital stock (at constant prices) did not differ significantly from that in 1938. The capital stock in the other years was calculated by using data on annual gross investment and on the annual retirement of written off capital goods. Annual depreciation at constant prices was then estimated by dividing the capital stock at the end of the year by the average life expectancy (40 years for "other buildings" and 15 years for equipment). Finally, the series at constant prices was converted into current prices with the aid of appropriate price indexes.

3.2. *Expenditure Approach*

Private Consumption[18]

In general, the value of a given expenditure category is calculated by multiplying the quantity actually consumed by the corresponding retail price.

[17]In accordance with NIS assumptions, the life expectancy of public buildings is set at 66.7 years.
[18]For more information, see Schroeven (1994).

The *quantities* consumed were estimated where possible by applying the so-called *direct* approach. This method uses specific final consumption data of private individuals, usually drawn from family-budget inquiries. In 1921 and 1928–29 the Ministry of Industry, Labour and Social Security carried out comprehensive budget investigations. This information is supplemented by budget inquiries conducted by private organizations in 1932, 1935–36 and 1938. These investigations, however, remained confined to certain social groups and provide only highly aggregated figures, especially as regards non-food expenditure.[19]

The absence of adequate source material on an annual basis frequently necessitated the adoption of the so-called *indirect* (or commodity flow) approach to estimate the quantities consumed. In the case of goods this procedure relies on statistics of agricultural or industrial production which, after subtraction of exports and addition of imports, are adjusted to take account of changes in stocks, intermediate consumption and waste. For services the indirect approach is based on sectoral employment data and average annual net earnings (e.g. consumption in the medical field).

In practice, both the direct and indirect approaches often had to be used in conjunction as the budget inquiries only provide information for a few years. The quantities consumed in the missing years were then interpolated and extrapolated using the commodity flow method or—in some cases—specific spending indexes (e.g. an index of bread consumption).

The *market price* paid by the final consumer was derived from retail prices recorded by the Ministry of Economic Affairs in order to compute its official retail price index or from prices charged by cooperatives, department stores and distributors. Whenever import or producer prices were used, Schroeven (1994) added a distribution margin. For some categories it was not possible to collect data on both quantities consumed and prices. In these cases fiscal statistics were used (e.g. spending on entertainment and recreation).

Government Consumption and Investment[20]

The annual Accounts of the Audit Office provide a detailed overview of total *central government* expenditure. In these reports, however, public spending is given by ministerial department and not by economic category. Since no distinction is made between consumption expenditure, investment and transfer payments, Clement (1995) had to scrutinize individually the thousands of recorded government transactions and assign them to the appropriate economic category. In a number of cases it proved necessary to refer to the original budget—as published in the Parliamentary Documents of the Chamber and the Senate—to obtain additional information.

The *Statistical Yearbooks* present the final accounts of the nine Belgian *provinces*, but on a far too aggregated basis and following a non-economic classification. More detailed budget information is found in the provincial archives.

[19]In the case of foodstuffs the research done by Roger (1942) supplied valuable spending data for 1939.

[20]For more details, see Clement (1995, pp. 69–220).

Consequently, a sample was taken to determine for each published spending category the shares of consumption and investment expenditure.

Concerning the *local authorities* the *Statistical Yearbooks* up to 1939 only include the accounts of municipalities with more than 40,000 inhabitants. Clement (1995) took samples in municipal archives to determine the share of consumption expenditure in every published spending category. Next, he expanded these figures to all Belgian municipalities using a detailed overview published by the predecessor of the NIS, which covers all municipal accounts for 1939.[21] Finally, investment expenditure of municipalities was estimated from the annual amount of loans granted by the *Gemeentekrediet* to local authorities.[22]

Gross Private Fixed Capital Formation

In this heading investment in dwellings and "other" capital formation (investment in plant, machinery, vehicles, ships, other buildings, etc.) are separately categorized. Buyst (1992) reconstructed from samples in land registry records annual series for housing construction and for the average cost of building a house. By multiplying these series and adding transaction costs, i.e. registration duties and notary costs, *investment in dwellings* was estimated.

The Belgian interwar production data are not sufficiently detailed to estimate *"other" capital formation* using the commodity flow approach. Therefore, the balance sheet method was adopted to derive gross fixed capital formation by type of industry.[23] Under the laws of 1913 and 1919, joint-stock companies were required to publish their annual balance sheets, and profit and loss accounts in the *Annexes au Moniteur Belge*. In the same publication joint-stock companies are also required to communicate, amongst other things, their paid-up capital and mergers. Since these obligations remained limited to joint-stock companies, the analysis of balance sheets was restricted to this legal form.

Van Meerten (1996, p. 51) distinguished 13 branches of industry. For each sector, he took a sample of joint-stock companies. From their balance sheets gross fixed capital formation per sample was calculated.[24] In order to estimate gross investment of all business enterprises in a certain sector, two extrapolations were made. First, the relationship between paid-up capital of the sample and total paid-up capital was used to extrapolate gross investment of the samples to all joint-stock companies. Second, the relationship between employment in joint-stock companies and employment in all companies was used to extrapolate gross investment of joint-stock companies in each sector to the level of all business enterprises per branch of industry. Owing to the relative absence of joint-stock companies in agriculture, forestry and fishing. Van Meerten (1996, pp. 72–140) used the perpetual inventory model to determine gross fixed capital formation in this sector.

[21]In the interwar period, municipalities with more than 40,000 inhabitants represented only a quarter or less of total Belgian population.

[22]The *Gemeentekrediet/Crédit Communal* is the bank of the Belgian municipalities. Consequently, almost all loans granted to local authorities are placed via this public credit institution.

[23]For more information, see Buyst *et al.* (1987, pp. 17–38) and especially Van Meerten (1996, pp. 7–35).

[24]In total, Van Meerten analyzed more than 25,000 balance sheets.

The value of *physical changes in stocks* was estimated by assuming that the stock data listed in the balance sheets of joint-stock companies were valued at replacement cost. Applying the extrapolation methods explained above. Van Meerten (1996, pp. 141–153) computed for each industry the book value of total stocks at the end of each year. Appropriate deflators were calculated, so that the value of physical changes in stocks could be determined.

Net Exports of Goods and Services

Customs statistics served as a starting point to estimate *merchandise trade*. Nevertheless, some adjustments were necessary to bring the customs statistics in line with SNA-conventions. From May 1922 customs statistics do not register Belgium's foreign trade as such, but that of the Belgo–Luxemburg Economic Union (BLEU). So, exports and imports of Luxemburg had to be excluded from the customs statistics in order to obtain Belgium's merchandise trade. Secondly, the value of imports was converted from a c.i.f. to a f.o.b. basis by deducting 10 percent of the total value of imports to account for freight and insurance costs.

For the *services balance*, no sources are available of an accuracy comparable to that of the customs statistics. The indirect methods used were to a large extent inspired by the work of Baudhuin on the Belgian balance of payments for the years 1924–25, 1929, 1935–37 and 1939.[25] Net income from freight transport undertaken by Belgian shipping companies, for instance, was estimated by assuming that these revenues were in the same proportion to the corresponding income of the United Kingdom as the tonnage of the Belgian merchant fleet to that of the British fleet.

3.3. *A Compromise Estimate of Belgian Nominal GNP*

Calculating nominal GNP via the income and expenditure approaches leads to different results. A conventional solution is to resolve the discrepancy by computing an arithmetic average of both figures, a so-called compromise estimate.[26] The results are found in Appendix, Table 4.[27]

4. The New Estimates in Constant Prices

Belgium was confronted by fierce price fluctuations during the interwar period. The construction of an appropriate GNP deflator is therefore of prime importance in evaluating the country's growth performance. As the value added approach is still far from complete, calculation of the deflator relies solely on the expenditure approach. The 1936–38 period was taken as a base, since these were years of relative price stability. Moreover, these years were used as a reference period for many official statistics, notably the index of retail prices. The main

[25]For more details, see Baudhuin (1926, pp. 209–29; 1931, pp. 179–99; 1937a, pp. 275–78; 1940, pp. 102–3).

[26]For a critique of this method, see Solomou and Weale (1991, pp. 54–56).

[27]By Act of March 6, 1925 (*Belgisch Staatsblad/Moniteur Belge*, March 7, 1925) the Eupen-Malmédy area was annexed to Belgium. The municipalities ceded by Germany added only 0.81 percent to Belgium's population, so that its impact on Belgian GNP can be neglected.

objective was to obtain, whenever possible, Paasche price indexes and Laspeyres volume indexes.

In the case of *private consumption* three basic rules were applied when estimating series in constant prices (Schroeven, 1994):

—if separate data were available on prices and quantities, series in constant prices were calculated by multiplying the quantities of the current year by the average price in the base-period;

—if separate data concerning prices and quantities were NOT available, either;

—the available series in current prices was divided by a suitable price index,[28]

or;

—the base-period value was multiplied by a suitable quantity index.

Using these rules more than 85 spending items were expressed individually in constant prices. The goods and services deflated individually represented almost 90 percent of total private consumption. Market prices in the base period (1936–38) were derived from retail prices recorded by the Ministry of Economic Affairs or from prices charged by cooperatives, department stores and distributors. Whenever import or producer prices were used, a distribution margin was added. Finally, the implicit consumption deflator is obtained by dividing consumer expenditure in current prices by consumer expenditure in 1936–38 prices. The deflator as calculated by Schroeven mirrors very closely Scholliers' consumer price index for the interwar period ($r^2 = 0.99$) which is based on independant research (Scholliers, 1991, p. 436).

Gross private fixed capital formation: For dwellings, investment in constant prices was calculated by multiplying the number of houses constructed by the average building cost of a house in the base-period. This amount, expressed in 1936–38 prices, was then corrected for the quality trend of new housing (Buyst, 1992, pp. 94–97). Van Meerten (1996, pp. 43–50) deflated current price investment in plant, machinery, etc. as follows. First, fixed capital formation was broken down by two types of assets, buildings and equipment. Next, he constructed price indexes for each type of asset. The index of building costs is based on an index of building material prices and an index of hourly wages in the construction sector. The price index for equipment is mainly based on weighted wholesale prices for metal products. Weighting the price indexes of buildings and equipment by their shares in total private fixed capital formation (dwellings excluded) produced the deflator for investment in plant and machinery.[29]

Government consumption in 1936–38 prices was calculated by distinguishing three spending categories: government wages and pensions, current expenditure on goods and services, and military expenditure. Clement (1995, pp. 75–80) deflated the first two categories using the private consumption deflator. Spending

[28] This procedure generates a deflator which takes the form of a Laspeyres price index. Research for the interwar period, however, has demonstrated that with regard to foodstuffs a deflator calculated according to the Paasche formula hardly differs from the one calculated with the Laspeyres formula (Schroeven and Solar, 1989, p. 164).

[29] Following the same principles Van Meerten (1996, pp. 36–50) also calculated separate deflators for each branch of industry.

on military equipment and facilities was deflated with a weighted price index of buildings and equipment.[30] *Government investment* was broken down by three types of assets: equipment, government buildings, and infrastructural works. For equipment the price index constructed by Van Meerten (1996, p. 50) was used. For buildings and infrastructure the deflators were taken from Buyst (1992, p. 248).

As Belgian foreign trade statistics provide data on both the value and volume of trade, the deflator of *exports and imports* of goods is based on unit value ratios. It is widely accepted that the unit value ratio of a group of products does not only measure actual price movements but also relative shifts in the group's composition. The more individual commodities are represented in a group the more serious this problem can be. Therefore, total imports and exports were broken down in 135 commodity groups (Degrève, 1982, pp. 151–988) and for each of them a separate unit value index was computed. Finally, a Paasche weighted average of these indexes was calculated (Horlings, 1996, pp. 21–26 and Appendix G).

Exports and imports of *services* cannot for the most part be accurately estimated at constant prices. In the case of shipping, for instance, the average profit per ton in 1936–38 was multiplied by the tonnage of the Belgian merchant fleet.

Adding the various series in constant prices, i.e. domestic expenditure and the net balance of exports and imports of goods and services, produces final expenditure in 1936–38 prices. The GNP deflator is then easily computed by dividing final expenditure in current prices by final expenditure in constant prices. Dividing the compromise estimate of GNP in current prices by the GNP deflator generates a compromise estimate of GNP in 1936–38 prices (Appendix, Table 4).

5. Conclusion

The new GNP estimates in current and constant prices for the Belgian economy between 1920 and 1939 are the result of extensive research. In contrast with previously published estimates, the GNP figures presented here are conceptually and methodologically consistent with those for the post-World War II period. The new series differ most significantly from Carbonnelle's estimates in terms of output volatility and the dating of cyclical turning points (see Figure 1). The new data reveal, for instance, a different pattern of growth in the 1920s: less rapid, interrupted by stagnation in the middle of the decade, and lasting till 1930. These findings correspond with other macroeconomic evidence (Scholliers, 1991).

The new GNP figures also raise many interesting questions about the performance of the Belgian economy in the interwar period. Traditionally, for instance, it is argued that the Belgian economic boom in the 1927–29 period was export-led. The advocates of this viewpoint stress that the franc was stabilized at too low a level in October 1926, which gave Belgian exporters a competitive advantage on world markets (Hogg, 1986, p. 21; Mommen, 1994, p. 1 and p. 10). The new national accounts, however, clearly indicate that domestic growth dominated the picture. What were the origins of the dynamic performance of domestic demand? Was the Belgian franc really undervalued in the 1927–29 period? The

[30] The price indexes of buildings and equipment were borrowed from respectively Buyst (1992, p. 248) and Van Meerten (1996, p. 50).

APPENDIX

TABLE 1

NATIONAL INCOME AT CURRENT PRICES

(in million BF)

	(1) Income from Paid Employment	(2) Entrepren. Income from Self-empl. & Partnerships	(3) Capital Income to Private Persons	(4) Capital Reserves of Companies + Dir. Tax.	(5) Government Income	(6) Interest on National Debt	(7) Depreciation	(8) Indirect Taxes minus Subsidies	(9) GNP at Market Prices
1920	9,335	11,391	3,403	464	138	−997	2,430	644	26,807
1921	10,319	10,386	3,519	351	236	−1,368	2,130	774	26,347
1922	10,634	9,308	4,312	459	427	−1,482	2,100	1,307	27,065
1923	12,286	12,265	5,516	760	476	−1,749	2,690	1,610	33,854
1924	14,734	14,360	6,639	831	372	−1,915	2,910	1,941	39,873
1925	15,345	14,280	7,771	803	601	−2,057	2,950	2,135	41,828
1926	16,827	17,415	9,361	1,065	481	−2,247	3,740	3,570	50,212
1927	22,557	20,036	10,506	2,481	1,214	−2,555	4,340	5,080	63,659
1928	25,885	22,598	12,084	2,472	1,256	−2,527	4,660	5,885	72,313
1929	30,350	24,678	13,415	2,991	1,457	−2,474	5,440	6,232	82,088
1930	32,470	23,569	15,597	3,941	1,147	−2,464	5,540	4,942	84,742
1931	29,328	20,891	15,560	2,834	843	−2,361	4,810	4,795	76,700
1932	25,504	18,098	15,885	341	779	−2,329	4,620	5,245	68,143
1933	24,806	18,320	15,668	−186	862	−2,407	4,300	5,646	67,009
1934	23,608	16,840	15,374	213	1,137	−2,410	4,150	5,372	64,283
1935	23,111	18,487	14,687	−72	1,154	−2,402	4,520	5,767	65,252
1936	25,727	19,102	15,654	441	1,241	−2,288	4,920	6,057	70,854
1937	29,416	21,586	16,365	725	1,427	−2,296	5,860	6,665	79,748
1938	30,303	22,690	16,092	346	1,406	−2,244	5,790	6,416	80,799
1939	29,843	21,735	15,567	217	1,376	−2,327	5,710	6,232	78,353

TABLE 2

FINAL EXPENDITURE AT CURRENT PRICES

(in million BF)

	(1) Private Consumption	(2) Public Consumption	(3) Gross Fixed Private Cap. Form.	(4) Gross Fixed Public Cap. Form.	(5) Changes in Stocks	(6) Exports	(7) Imports	(8) GNP at Market Prices
1920	20,528	1,991	7,700	862	1,917	9,164	12,087	30,074
1921	21,051	2,046	5,252	799	875	7,474	9,748	27,748
1922	21,242	2,146	4,883	716	−501	7,369	9,663	26,192
1923	25,744	2,277	5,483	604	326	11,103	13,556	31,981
1924	31,287	2,342	6,588	616	1,087	15,747	18,216	39,452
1925	33,255	2,709	6,140	733	−388	16,825	18,458	40,816
1926	40,501	2,728	6,229	606	549	23,049	24,088	49,575
1927	50,085	3,494	7,728	677	1,568	30,154	30,680	63,025
1928	55,319	4,471	10,253	774	1,574	34,658	33,288	73,762
1929	61,670	4,969	15,440	1,337	2,350	36,275	37,121	84,920
1930	66,842	5,806	15,093	1,826	2,466	30,340	32,789	89,584
1931	63,847	5,804	11,367	1,465	−28	26,720	25,890	83,284
1932	57,418	5,296	8,624	1,053	−620	17,677	17,796	71,653
1933	55,817	4,999	7,890	1,206	502	16,774	16,483	70,596
1934	52,960	5,330	6,005	1,045	−986	16,013	15,221	65,145
1935	53,688	5,085	6,479	1,353	20	18,600	18,586	66,640
1936	56,959	5,516	6,551	1,432	−42	22,738	23,061	70,092
1937	62,376	6,337	8,149	1,942	1,328	29,115	28,732	80,514
1938	64,543	6,780	8,492	1,905	119	24,570	23,950	82,459
1939	63,108	9,001	6,899	1,485	−1,537	24,172	20,523	82,605

TABLE 3

FINAL EXPENDITURE AT 1936-38 PRICES

(in million BF)

	(1) Private Consumption	(2) Public Consumption	(3) Gross Fixed Private Cap. Form.	(4) Gross Fixed Public Cap. Form.	(5) Changes in Stocks	(6) Exports	(7) Imports	(8) GNP at Market Prices
1920	42,414	3,185	10,709	1,518	2,258	9,094	14,830	54,347
1921	44,950	3,729	9,273	1,493	1,393	9,106	14,757	55,187
1922	48,797	4,188	9,130	1,407	−875	11,686	17,373	56,961
1923	50,084	3,850	8,120	979	372	14,795	17,905	60,294
1924	53,325	3,399	9,364	897	1,313	16,798	20,083	65,013
1925	53,680	3,806	8,804	1,091	−468	17,552	19,178	65,288
1926	53,964	3,210	7,543	713	401	21,388	20,188	67,031
1927	53,910	3,235	7,865	680	1,228	21,972	21,506	67,385
1928	56,529	3,969	9,716	738	1,166	25,182	23,809	73,491
1929	58,266	4,131	12,632	1,124	1,753	24,895	26,311	76,490
1930	60,827	4,838	12,900	1,553	2,158	22,227	25,603	78,900
1931	62,676	5,314	11,671	1,467	−76	23,001	26,578	77,475
1932	60,138	5,372	9,679	1,218	−831	18,958	21,418	73,117
1933	58,849	5,191	9,880	1,512	645	19,315	22,648	72,743
1934	57,870	5,945	8,024	1,366	−1,447	20,068	21,999	69,827
1935	58,617	5,714	8,116	1,697	−154	22,028	22,557	73,462
1936	59,973	5,895	7,577	1,640	−121	24,444	24,654	74,754
1937	61,926	6,239	7,741	1,838	1,236	27,656	27,283	79,353
1938	61,953	6,463	7,844	1,781	117	23,732	23,405	78,485
1939	60,358	8,499	6,410	1,458	−1,460	24,028	22,673	76,621

TABLE 4

COMPROMISE ESTIMATE OF GNP AT MARKET PRICES

(in million BF)

	(1) Current Prices	(2) 1936–38 Prices
1920	28,441	51,395
1921	27,048	53,794
1922	26,629	57,909
1923	32,917	62,059
1924	39,662	65,360
1925	41,322	66,097
1926	49,893	67,462
1927	63,342	67,724
1928	73,037	72,769
1929	83,504	75,215
1930	87,163	76,768
1931	79,992	74,412
1932	69,898	71,326
1933	68,802	70,895
1934	64,714	69,365
1935	65,946	72,697
1936	70,473	75,160
1937	80,131	78,975
1938	81,629	77,695
1939	80,479	74,649

TABLE 5

ALTERNATIVE ESTIMATES OF BELGIAN GDP/GNP AT CONSTANT PRICES (1936–38 = 100)

	(1) Carbonnelle (1959)	(2) Maddison (1991)	(3) New Estimates Income Approach	(4) New Estimates Expenditure Approach	(5) New Estimates Compromise Estimate
1920	63.3	73.1	62.9	70.1	66.5
1921	64.6	74.4	68.0	71.2	69.6
1922	75.9	81.7	76.4	73.5	74.9
1923	81.0	84.6	82.9	77.8	80.3
1924	84.8	87.4	85.3	83.9	84.6
1925	87.3	88.7	86.9	84.2	85.5
1926	92.4	91.7	88.1	86.5	87.3
1927	97.5	95.1	88.4	86.9	87.6
1928	105.1	100.1	93.5	94.8	94.2
1929	102.5	99.2	96.0	98.7	97.3
1930	100.0	98.3	96.9	101.8	99.3
1931	96.2	96.5	92.6	99.9	96.3
1932	88.6	92.2	90.3	94.3	92.3
1933	91.1	94.2	89.6	93.8	91.7
1934	89.9	93.4	89.5	90.1	89.8
1935	98.7	99.2	93.4	94.8	94.1
1936	101.3	99.9	98.1	96.4	97.3
1937	101.3	101.2	102.0	102.4	102.2
1938	97.5	98.9	99.8	101.2	100.5
1939	NA	(105.6)	94.4	98.8	96.6
1953	126.6	124.9	130.0	129.1	129.5

new GNP estimates are an excellent framework to discuss these and other important issues from a comparative point of view.

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50th Anniversary
Cambridge, England, August 23–29, 1998

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The Twenty-fifth General Conference of the International Association for Research in Income and Wealth will be held in Cambridge, England on August 23–29, 1988—the site of the first IARIW General Conference. There will be five plenary sessions, four parallel sessions and at least two contributed papers sessions. The topics and organizers of individual sessions are given below. Anyone interested in submitting a paper to be considered for any of these sessions should write directly to the appropriate Session Organizer, enclosing an outline or abstract for the proposed paper.

MONDAY, AUGUST 24, MORNING:

PLENARY SESSION 1

Intergration of Social and Economic Statistics and the Measurement of Well-Being

Organizer: Henry Neuberger, Office for National Statistics, EAS Division, Government Offices, Great George Street, London SW1P 3AQ, United Kingdom

MONDAY, AUGUST 24, AFTERNOON:

PLENARY SESSION 2

Intergenerational Transfers
Organizer: Lars Osberg, Department of Economics, Dalhousie University, Halifax, N. S. B3H 3J5, Canada

TUESDAY, AUGUST 25, MORNING:

PLENARY SESSION 3

Management Under Inflation

Organizer: Jean-Etienne Chapron, 175 East 96th Street, Apartment 29-Q, New York, New York 10028, U.S.A. Telephone and Fax 212 966 3327

TUESDAY, AUGUST 24, AFTERNOON:

PARALLEL SESSION 4A

The Role of National Accounting in Teaching Economics
Organizer: Steven Keuning, Van Der Boechorststraat 92, 1081 BW Amsterdam, Netherlands

PARALLEL SESSION 4B

The Changing Relationship Between the Distribution of Work and the Distribution of Family Income
Organizer: Stephen Jenkins, ESCR Research Center on Micro-Social Change, University of Essex, Colchester CO4 3SQ, United Kingdom

WEDNESDAY, AUGUST 26, ALL DAY EXCURSION:

THURSDAY AUGUST 27, MORNING:

PLENARY SESSION 5

Measurement of Growth and Distribution in Developing Countries
Organizer: Adam Szirmai, Department of Technology and Development Studies, University of Technology, Postbus 513, 5600 MB Eindhoven, Netherlands

THURSDAY, AUGUST 27, AFTERNOON:

PARALLEL SESSION 6A

Long-Run Trends in Income Distribution
Organizer: Anders Bjorklund, Swedish Institute for Social Research, Stockholm University, 10691 Stockholm, Sweden

PARALLEL SESSION 6B

Analytical Uses of National Accounts
Organizer: Reiner Staeglin, Deutsches Institut fur Wirtschaftsforschung, Konigin-Luise Str. 5, D-14195 Berlin, Germany

FRIDAY, AUGUST 28, MORNING:

PLENARY SESSION 7

Milestones in Economic Measurement: 50 Year Retrospective of the IARIW
Organizer: John Kendrick, 6363 Waterway Drive, Falls Church, VA 22044 U.S.A.
(CLOSED SESSION)

FRIDAY, AUGUST 28, AFTERNOON:

Contributed Papers Session

Organizer: Edward Wolff, Department of Economics, New York University, 269 Mercer Street, Room 700, New York, NY 10003 U.S.A.

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