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**Changes in the occupational structure of Belgium:
New estimates for the 1846-1910 period**

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1. Introduction

The purpose of this paper is straightforward: to present new estimates of the male and female labour force in each sector of the Belgian economy between 1846 and 1910 at regular intervals. Moreover the classification of occupations over the various branches of industry has to be in line with generally accepted conventions in order to facilitate international comparisons.

A more accurate picture of the changes in the occupational structure in different sub periods can provide more insight in the nature of the Belgian industrialization process. This is not an irrelevant question as Belgium is often characterized in the international literature as the second industrial nation in the world (Wrigley, 1961; Milward and Saul, 1973; Pollard, 1981). Similarities in factor endowments to the British situation – e.g. relatively abundant coal and iron deposits – and the eagerness of Belgian entrepreneurs to imitate British innovations at an early stage produced in the 19th century an industrial structure not very different from the British one.

Concerning the long-term evolution of total employment in Belgium the book by Guido De Brabander (1981), *Regional Specialization, Employment and Economic Growth in Belgium between 1846 and 1970* is often used as the typical reference (see e.g. Segers, 2003). First, we demonstrate that the data he produced for the 1846-1910 period suffer from serious deficiencies. Second, we develop an alternative method and third, a short interpretation of the new figures obtained is presented.

2. A critical appraisal of De Brabander's employment data, 1846-1910

De Brabander made a very serious effort to make the various Belgian industrial censuses (IC) comparable through time¹. In particular he carefully analyzed the questions asked in the different ICs: how precise are these questions, what is the scope for misinterpretations, how did they change through time, who is exactly counted, etc. Furthermore, he investigated in detail the preparation of the industrial censuses and the control procedures on the obtained results. Finally, he devised a reclassification system per branch of industry to make them comparable through time.

Despite these impressive efforts closer scrutiny of De Brabander's work reveals some serious deficiencies. First, concerning the pre-World War I period he only provides employment data for 1846, 1896 and 1910. Of course, it is not his fault that the 1866 IC was never published because of too poor quality, and that the 1880 IC registered only a limited number of sectors. Nevertheless, the problem remains that there is a blind spot of half a century, precisely during the period that the industrial revolution in Belgium reached its 'maturity phase' (Gadisseur, 1981). It is clear that such a gap impedes any serious analysis of the process of structural change during this crucial era.

Second, we calculate the economic activity rates of Belgium according to De Brabander's data and compare them with those of England/Wales following Gazeley's method (Gazeley, 2007). Before doing so, we have to harmonize the definitions used. The Belgian data refer to total employment and not to the labour force, so we have to add the number of unemployed. As we only dispose of a more or less reliable unemployment figure for 1910, we pragmatically assume a constant unemployment rate for 1896².

¹ The English version of his book (De Brabander, 1981) provides but a short critical evaluation of the ICs. The Dutch version (De Brabander, 1984) however contains a very comprehensive analysis of each IC.

² The unemployment rate in 1910 for Belgium amounts to 3.6 %, a figure which is very much in line with similar estimates for Britain (Boyer and Hatton, 2002) and the Netherlands (Smits, Horlings and van Zanden, 2000).

Table 1: The labour force participation rate in Belgium and England/Wales, 1896-1911 (in %)

Belgium		
	1896	1910
(1) Total employment	2 457 715	2 512 685
(2) Unemployed	89 058	94 473
(3) Men 16-64 and women 16-59	3 733 224	4 423 716
(4) Labour force participation rate = $((1)+(2))/(3) \times 100$	68 %	59 %
England and Wales		
	1901	1911
(5) Labour force participation rate	79 %	79 %

Sources:

Belgium (1): 1846 and 1910: De Brabander (1981); 1896: De Brabander (1984)³.

(2): IC 1910, vol. II, p. 1414.

(3): Interpolation PC 1890, vol. I, p. LIII and PC 1900, vol. I, p. LXVI; PC 1910, vol. I, p. 223.

England/Wales (5): Gazeley (2007).

Table 1 suggests that Belgium was characterized by an unusually low labour force participation rate compared to England/Wales. Around 1900 the labour market in both countries was still very much determined by free market forces, so we see no rationale that can explain these large differences. A more plausible hypothesis is therefore that De Brabander's figures seriously underestimate Belgium's labour force.

³ The employment figure for 1896 is slightly different in De Brabander (1981) versus De Brabander (1984). As the 1984 book is much more detailed on the issue than the 1981 one, we took the employment figure published in 1984.

Third, table 1 suggests that the Belgian labour force participation rate decreased substantially between 1896 and 1910. From an international perspective this decline contrasts sharply with the stability recorded in England/Wales and in other countries (e.g. for the Netherlands, see Smits, Horlings and van Zanden, 2000). Domestic elements also cast doubt on a scenario of a drastic reduction of the labour force participation rate. As in most other west European countries the Belgian system of unemployment benefits was still in its infancy. Having no job brought most people immediately on the brink of misery. Moreover, according to De Brabander total employment increased by only 2.2 % between 1896 and 1910, while in the same period the population between 16 and 64 of age – 16 to 59 for women – went up by 18.5 %⁴. Once again this seems highly improbable as Belgium experienced rapid economic growth in the two decades preceding World War I (Gadisseeur, 1973).

Fourth, De Brabander makes no distinction between male and female employment. It is clear however that the way in which paid work carried out by women is recorded in the censuses changed considerably through time (Roberts, 1995; Bracke, 1996). From the late 19th century until well into the 20th century many western governments believed that women working outdoors neglected their family and therefore contributed to social unrest. This negative attitude was reflected in more restrictive enumeration methods towards female labour. Consequently, adding the employment figures of men and women can distort the total picture through time.

⁴ We use these age brackets only to minimize the effects of changes in the age composition of the population. Many youngsters started working before the age of 16 and there was no official retirement age, except for civil servants.

3. De Brabander's method: the industrial censuses as benchmark

We argued that the De Brabander's employment estimates are too low and that there is evidence that the degree of underestimation varies substantially through time. In order to be able to remedy these deficiencies we have to know the cause(s).

3.1. Estimating employment in the manufacturing sector

A first problem is the type of sources that De Brabander uses. His starting point is the ICs. In an *industrial* census typically all business people in the manufacturing sector – including mining, quarrying and building – are asked to provide information about the number of blue- and white-collar workers in their enterprise, about the number and power of their machines, etc. An important advantage of the ICs over the traditional population (or occupation) censuses is that employment is directly measured. The unemployed are not recorded, e.g. in 1846, or registered separately, e.g. in 1910. In addition employment is classified according to the branch of activity and according to the place of occupation. This facilitates the analysis of structural change.

But the employment data recorded in ICs also have their weaknesses. The introductions to respectively the 1846 IC and 1910 IC clearly state that fear of the tax authorities gave employers an incentive to declare a lower number of workers than was actually the case (IC 1846, p. XVI; IC 1910, vol. I, p. LXXVII). Moreover in 1846 the vagueness of the question asked – what is the *average* number of workers in your firm⁵ – gave business people ample opportunities to play around with the figures. Probably the problem of underreporting was even aggravated by the severe economic crisis that struck the densely populated western part of Belgium in the 1845-1847 period. Many workers drifted from one temporary job to another, so employers could easily argue that these labourers had no real link with their enterprise.

⁵ Our italics and free translation (IC 1846, p. LX). See also De Brabander (1984).

In order to eliminate this element of vagueness the later ICs explicitly asked for the number of workers at the census date. But in some circumstances this solution introduced new deficiencies. The 1910 IC was held on 31 December, so many seasonal workers in e.g. the building industry remained unrecorded (IC 1910, vol. VIII, p. 73). The 1896 IC suffered less from this problem because it was organized in October⁶. This difference in census date explains to some extent the distortion between the employment figures of 1896 and 1910 observed in table 1.

Finally, De Brabander excludes home workers from his industrial employment data. The main reason is that the 1846 IC did not register them. And he adds: *“From an economic point of view this group is not too important: home-working was in almost every case a complementary job...”* (De Brabander, 1981, p. 56). In our opinion this statement does not stand up to the historical facts. The collapse of the rural linen industry in the second half of the 1840s plunged the western part of Belgium for decades in a deep structural crisis. It indicates that domestic industry was a vital part of that region’s economy (Verhaegen, 1961). In addition table 2 shows that around 1900 the number of people working in the home industry, especially women, was still very considerable.

Table 2: Employment in domestic industry, 1896-1910 (in numbers)

	Men	Women	Total
1896	51 709	80 640	132 349
1910	42 191	119 531	161 722

Source: IC 1896, vols. I-II and IC 1910, VIII, pp. 168-169.

⁶ This was also the case for the 1846 IC.

3.2. Estimating employment in agriculture and the tertiary sector

As indicated earlier, industrial censuses typically register the number of blue- and white-collar workers in the manufacturing sector – including mining, quarrying and building⁷. So how did De Brabander produce estimates for the agricultural and tertiary sector?

What agriculture is concerned, De Brabander (1984) developed fairly complicated procedures based on the exploited surface to adjust the agricultural censuses of 1846 and 1895. Somewhat similarly, he recalculated the population (or occupation) census of 1910 by introducing rather arbitrary weights to compensate for part-time labour. It is beyond the scope of this paper to go into the technicalities of these procedures. Bottom-line is that De Brabander believes that both the agricultural and the population censuses (PC) seriously overestimate total employment in agriculture. So for e.g. 1910 his recalculation method reduces agricultural employment from 780 523 persons as recorded in the original PC to 548 386 persons.

Concerning the tertiary sector, De Brabander takes the PCs of 1846, 1890-1900⁸ and 1910 as a starting point. Again he is convinced that the PCs substantially overestimate employment. Therefore he calculates the ratio between the industrial and tertiary labour force in the various PCs. Next these ratios are multiplied with the industrial employment figures as derived from the ICs described above. Table 3 shows the impact of this procedure on tertiary employment.

⁷ An important exception is the 1910 census which also includes e.g. the trade sector. De Brabander (1984) convincingly demonstrated however that these figures are unreliable.

⁸ There was no population census in 1896, so he interpolated the PCs of 1890 and 1900.

Table 3: De Brabander's revision of tertiary employment, 1846-1910 (in numbers)

	1846	1896	1910
Population census	217 845	911 891	978 402
De Brabander's estimate	185 500	754 600	783 400

Source: De Brabander (1984)

Our discussion in paragraph 3.1 demonstrated that De Brabander seriously underestimated employment in the manufacturing sector. By using the procedure outlined above this bias is transmitted to the tertiary sector as well.

4. An alternative estimation method

So far we have been highly critical of De Brabander's method, but what is our alternative. First, we have to define what we want to measure. Since we are not interested in (short-term) business cycle analysis but in (long-term) structural change, estimating the labour force in the various branches of industry is our goal. Whether these people are employed or unemployed is of course far from irrelevant, but not our major concern here. Pragmatic reasons also explain this approach: most 19th-century sources do not make a clear distinction between employment on the one hand and unemployment or underemployment⁹ on the other hand. Economists typically exclude from the labour force rentiers – in the case that they are not actively managing their assets – students, retirees, individuals in institutions, and those staying at home to take care of the children (Hamermesh and Rees, 1993).

⁹ Underemployment often took the form of hidden unemployment, especially in agriculture.

4.1. Rehabilitating the Belgian population censuses?

Our approach brings the population censuses (PC) back into the limelight. In principle the government organizes a PC every decade, so we dispose over considerably more observations than the ICs mentioned earlier: 1846, 1856, 1866, 1880, 1890, 1900 and 1910. Moreover, a PC is much broader in scope as every resident has to indicate his or her occupation. Contrary to the ICs, not only the manufacturing sector but all kinds of work are included (Peeters, Goossens and Buyst, 2005). In a PC the unemployed usually declare their previous job, but this solves to a certain extent the problem that most PCs were held on 31 December. So our results are not blurred by the effects of seasonal unemployment.

In 1910 both an IC and PC were organized simultaneously¹⁰. In table 4 we compare the original results of both sources concerning the total labour force in manufacturing. Some adjustments are necessary as the IC excludes the unemployed and the Belgians working abroad, but includes foreigners working in Belgium. The PC on the other hand includes the unemployed and Belgians working abroad but does not register foreigners working in Belgium. According to De Brabander (1984) the net outflow of cross-border workers in 1910 can be estimated at around 47 000 persons.

Introducing these adjustments reduces the deviation between both sources to about 9%. Referring to our earlier criticisms towards the ICs it comes as no surprise that the PC shows a higher figure. But the difference remains within reasonable limits, which suggests that at least the 1910 PC does not grossly overestimate the total labour force as De Brabander generally assumes.

¹⁰ This was also the case in 1846, but unfortunately the 1846 IC did not include domestic industry which makes a comparison with the PC impossible.

Table 4: Total labour force in the manufacturing sector, including mining, quarrying and building (1910, original figures in numbers)

	Industrial Census	Population Census
Employed	1 347 198	
Unemployed	82 857	
Cross-border workers	47 000	
Total	1 477 055	1 609 889

Source: 1910 IC, 1910 PC and De Brabander (1984).

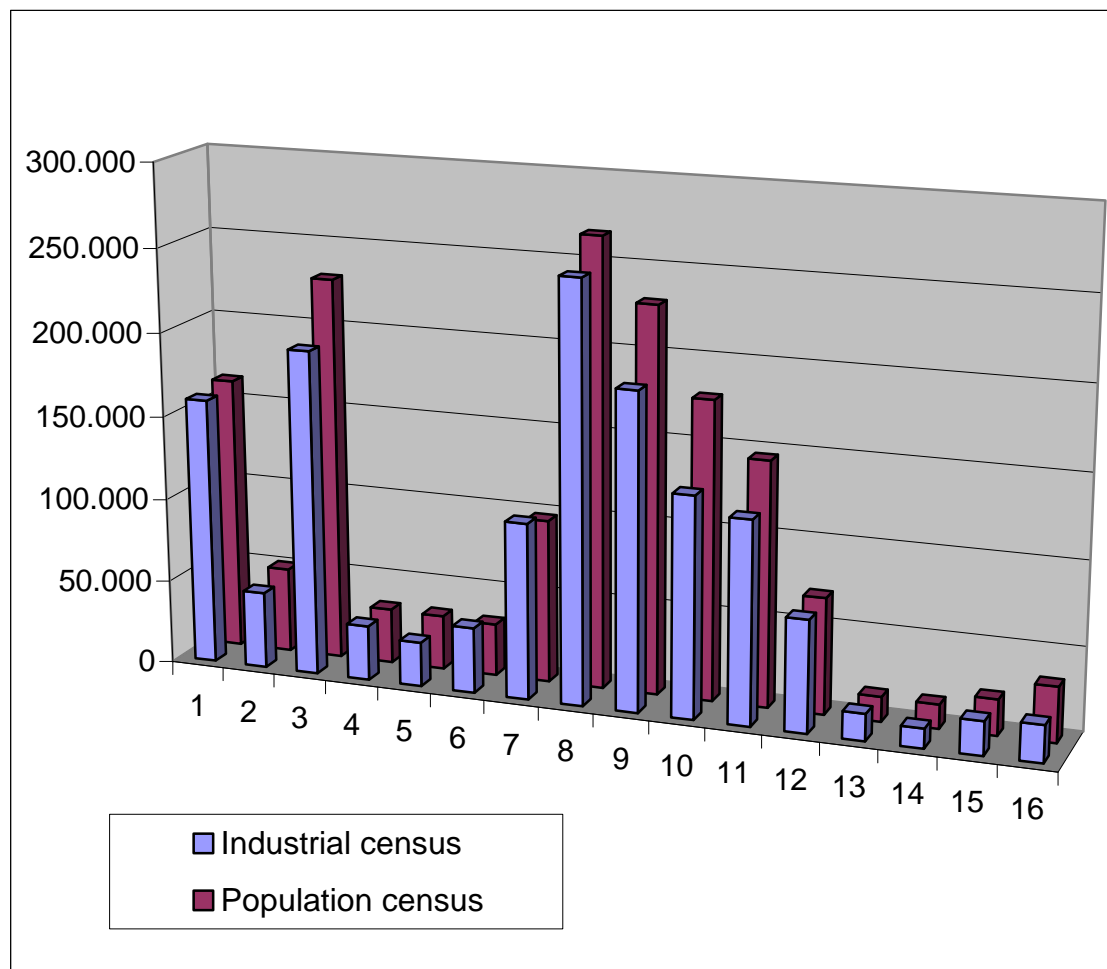
Comparing the 1910 IC and PC in a somewhat more detailed way allows us to test another claim of De Brabander. In his view a classification according to occupation is difficult to reconcile with one according to the branch of activity. His typical example is a carpenter in the shipbuilding industry which will be classified in the sector 'wood' in a PC and the sector 'metal' in an IC. Moreover in an era that multiple job holding was still important it remains unclear which occupation was actually declared in a PC.

Taking a closer look at the 1910 PC reveals however that the census followed very much an economic classification by sector. In figure 1 we compare the labour force in the manufacturing by sector according to the original classification of two sources. A visual inspection indicates that the shape of both frequency distributions is very similar, an impression which is confirmed statistically by using a chi-square test.

Not surprisingly the largest deviations are found in 'other industries' and in 'construction'. What the latter sector is concerned, we already referred to seasonal elements. Another factor is the large number of casual workers in the building industry. Even when they were at work during the census period, many employers probably did not include them in the IC because these workers had no structural link with their firm. Conversely, the casual workers – even when they did not have a job during a couple of days – probably did not

consider themselves being really unemployed, so they also escaped this part of the IC¹¹.

Figure 1: The labour force by sector in manufacturing (1910, original figures in numbers)



Source: 1910 IC and 1910 PC.

Legend: 1. mining, 2. quarrying, 3. metal, 4. ceramics, 5. glass, 6. chemicals, 7. food, 8. textiles, 9. apparel, 10. construction, 11. wood and furniture, 12. leather, 13. tobacco, 14. paper, 15. printing and 16. other industries.

¹¹ For a detailed discussion, see Buyst (1992).

All these elements suggest that the quality of the PCs is not as bad as De Brabander claims. Of course, the 1910 PC is arguably the best of all population censuses of the period under consideration (Klep, 1976). As we go further back into time the problem of ill-defined occupations becomes more and more serious (Karush?). Nevertheless we can use the 1910 PC as a solid starting point for the reconstruction of a new database.

4.2. The construction of new labour force time series

Our time series has to meet certain criteria. First, the classification of occupations over the various sectors should be in line with generally accepted conventions in order to facilitate international comparisons. Second, the classification used has to be consistent over the 1846-1910 period.

The 1910 PC was published according to an economic classification by sector. Therefore we use the International Standard Industrial Classification of All Economic Activities or ISIC developed by the United Nations (1968) as a point of reference. ISIC has the advantage that it allocates a very large list of different occupations or activities to a set of well-defined economic sectors¹². ISIC's major categories are still too detailed for a 19th-century time series so we have to amalgamate some sectors.

The evolution of the labour force in agriculture between 1846 and 1910 has provoked a heated debate in Belgian historiography that raged for several decades (Verhaegen, 1961; Gadisseur, 1973; Klep, 1976; Gubin and Van Neck, 1981; De Brabander, 1984, etc.). It is beyond the scope of this paper to go into the technical details of the discussion. We only mention that the main controversy was about how to reclassify a part of the ill-defined workers and of the domestic servants. Goossens (1992) carefully investigated the arguments of the various authors and came to the conclusion that Klep's estimation procedure was the most reliable one. Therefore we reproduce his

¹² For an interesting sociological inspired alternative, see van Leeuwen et al. (2002).

figures in tables 5, 6 and 7. In the light of our previous discussions it is important to point out that Klep (1976) maintains the labour force in agriculture as published in the 1910 PC, without adjustments.

Tables 5, 6 and 7, see excel sheet

Certainly not all problems are solved at this moment. The PCs of 1880, 1890 and 1900 counted for instance the number of occupations and not the number of persons occupied. From a macroeconomic perspective this creates an overestimation of the labour force of about 2.5%, but the distribution over the various sub sectors remains unclear. In addition the classification of the hundreds of occupational categories in the original PCs over the subsections mentioned in tables 5-7 has to be refined further in the near future. Nevertheless we do not expect that the general outlook of tables 5-7 will change substantially¹³.

5. A short interpretation of the results obtained

Despite all warnings of De Brabander the PCs allow us to produce a consistent picture of the changes in the occupational structure of Belgium between 1846 and 1910. However the total labour force data of agriculture and manufacturing seem more robust than those of the service sector. More specifically the figures for the sub sectors 'transport and communications' and 'business services' are characterized by sudden jumps towards the end of the period under consideration. As expected the data for the female labour force are more volatile.

¹³ On an aggregate level our estimates are in line with the older and often forgotten work of Bairoch et al. (1968) and Karush (1977). Their figures for the agricultural sector are somewhat higher at the expense of manufacturing sector and they treat the service sector in far less detail.

When we compare our results to those of De Brabander (1984) at least two observations can be made. First, the new labour force data are much higher – in 1910 the difference amounts to almost 900 000 persons. Consequently, our labour participation rates are very much in line with those of England/Wales (see table 1).

Table 8: The structure of employment/labour force in Belgium (in %)

	De Brabander			New Estimates		
	1846	1896	1910	1846	1900	1910
Agriculture	55.2	31.4	21.9	42.6	26.3	22.7
Manufacturing	31.6	38.0	46.9	35.9	43.1	46.9
Services	17.2	30.6	31.2	21.5	30.6	30.4

Source: De Brabander (1984) and table 7.

Second, the new estimates do not only imply a level shift, but also cast a different light on the speed of structural change. The weight of agriculture in 1846 is revised downward in a substantial way. So by the mid-19th century Belgium was already more industrialized than previously thought. Moreover in the 1846-1910 period the release of labour by the agricultural sector was slower which, according to the Broadberry (1997) thesis, implies that economic growth was more modest than anticipated. All these elements seem to confirm the Crafts-Hartley view on British industrialization for the Belgian case too.

References

Industrial censuses, 1846, 1896, 1910.

Population censuses, 1846, 1856, 1866, 1880, 1890, 1900, 1910.

Bairoch, P. et al. (1968), *La population active et sa structure. The Working Population and its Structure*, Brussels: Institut de Sociologie.

Boyer G. and Hatton, T. (2002), New Estimates of British Unemployment, 1870-1913, in *Journal of Economic History*, vol. 62, pp. 643-675.

Bracke, N. (1996), De vrouwenarbeid in de industrie in België omstreeks 1900. Een “vrouwelijk” analyse van de industrietelling van 1896 en de industrie- en handelstelling van 1910, in *Belgisch Tijdschrift voor Nieuwste Geschiedenis*, vol. 26, pp. 165-207.

Broadberry, S. (1997), *The Productivity Race. British Manufacturing in International Perspective, 1850-1990*, Cambridge: University Press.

Buyst, E. (1992), *An Economic History of Residential Building in Belgium Between 1890 and 1961*, Brussels: Koninklijke Academie.

De Brabander, G. (1981), *Regional Specialization, Employment and Economic Growth in Belgium between 1846 and 1970*, New York: Arno Press.

De Brabander, G. (1984), *De regionaal-sectoriële verdeling van de economische activiteit in Belgium (1846-1979): Een kritische studie van het bronnenmateriaal*, Leuven-Brussels: Nauwelaerts.

Gazeley, I. (2007), Manual Work and Pay, 1900-1970 in Crafts, N., Gazeley, I. and Newell, A. (eds.), *Work and Pay in Twentieth-Century Britain*, Oxford: University Press.

Gadisseur, J. (1973), Contribution à l'étude de la production agricole en Belgique de 1846 à 1913, in *Revue belge de l'histoire contemporaine*, vol. 4, pp. 1-48.

Gadisseur, J. (1981), De industriële doorbraak, in De Brabander G., Bruwier M. and J. Gadisseur (eds.), *De industrie in België: twee eeuwen ontwikkeling, 1780-1880*, Gent: Snoeck-Ducaju, pp. 51-104.

Goossens, M. (1992), *The Economic Development of Belgian Agriculture: A Regional Perspective, 1812-1846*, Brussels: Koninklijke Academie.

Gubin, E. and Van Neck, A. (1981), La répartition professionnelle de la population belge en 1846: un piège statistique, in *Acta Historica Bruxellensia*, Brussels: ULB, vol. 4, pp. 269-364.

Hamermesh, D. and Rees, A. (1993), *The Economics of Work and Pay*, New York: HarperCollins (5th edition).

Karush, G. (1977), Industrialisation et changements de la population active en Belgique de 1846 à 1910, in *Population et Famille*, vol. 40, pp. 37-76.

Klep, P. (1976), De agrarische beroepsbevolking van de provincies Antwerpen en Brabant en van het Koninkrijk België, 1846-1910. Nieuwe evaluaties van het kwantitatief-historisch materiaal, in *Bijdragen tot de Geschiedenis*, vol. 59, pp. 25-69.

Milward, A. and Saul, S. (1973), *The Economic Development of Continental Europe 1780-1870*, London: Allen and Unwin.

Peeters, S., Goossens, M. and Buyst, E. (2005), *Belgian National Income during the Interwar Period. Reconstruction of the Database*, Leuven: University Press.

Pollard, S. (1981), *Peaceful Conquest. The Industrialization of Europe 1760-1970*, Oxford: University Press.

Roberts, E. (1995), *Women's Work, 1840-1940*, Cambridge: University Press.

Segers, Y. (2003), *Economische groei en levensstandaard. De ontwikkeling van de particuliere consumptie en het voedselverbruik in België, 1800-1913*, Leuven: University Press.

Smits, J.-P., Horlings, E. and van Zanden (2000), *Dutch GNP and its Components, 1800-1913*, Groningen: Groningen Growth and Development Centre.

United Nations (1968), *International Standard Industrial Classification of All Economic Activities* (Statistical Papers, Series M, n° 4/2), New York.

van Leeuwen, M. et al. (2002), *HISCO. Historical International Standard Classification of Occupations*, Leuven: University Press.

Verhaegen, B. (1961), *Contribution à l'histoire économique des Flandres*, 2 vols. Leuven-Paris: Nauwelaerts.

Wrigley, E.A. (1961), *Industrial Growth and Population Change*, London: Cambridge University Press.