

Tall Farmers and Tiny Weavers

*Rural Living Standards and Heights in Flanders, 1830-1870**

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Abstract

The evolution of the average stature of convicts between 1830 and 1870 in the prisons of Ghent and Bruges is used as a measure of the biological standard of living and suggests progress in the quality of life in the Flemish countryside, particularly for children born after 1850. Heights are used to shed light on regional variations. Prisoners born in coastal Flanders were on average shorter than inmates born in inland Flanders. Heights furthermore provide a key to discovering specific socio-economic differences that can explain such variations, showing that wage labourers in coastal Flanders and textile workers in inland Flanders were the shortest occupational groups, especially before 1850. As such, heights provide a nuanced picture of living standards in rural Flanders during the nineteenth century.

1 Introduction

The middle of the nineteenth century is considered to be a crucial period in the evolution of living standards in Belgium. During the second half of the century, an agrarian revolution, developments in communication and transport, strong industrialisation and rapid demographic growth shaped a new socio-economic environment.¹ The urban industrial centres in the

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¹ G. Dejongh and Y. Segers, 'Een kleine natie in mutatie. De economische ontwikkeling van de Zui-

country's Walloon region were the driver of the Belgian economy, but the picture for the north, rural Flanders, was dominated by widespread poverty, as powerfully described in 1903 by the journalist August De Winne in his book *Through Poor Flanders*.² According to historian Chris Vandembroeke, in the middle of the eighteenth century the population of Flanders was an 'industrious and prosperous folk'. However, by 1850 there was little wealth to be seen in the Flemish countryside, mainly due to structural problems in the rural linen industry.³

So far, our knowledge of the evolution of livings standards in nineteenth-century Flanders has primarily been based on aggregate data on purchasing power (prices and wages) at the national level, demographic and social data (population size, mortality, poor relief) at the provincial and district level, and food consumption and health at the urban level.⁴ However, we know very little about the evolution of living standards in the Flemish countryside and for specific occupational groups.⁵ In this article, I examine the quality of life in rural Flanders, the provinces of West and East Flanders, during the nineteenth century by means of heights. In recent decades, scholars have increasingly used stature as well as other biological measures (weight, life expectancy, morbidity) because conven-

delijke Nederlanden/België in de eeuw 1750-1850', *Tijdschrift voor Geschiedenis* 2 (2001) 171-194, 171-173.

2 The book is a collection of reportage written in 1901 for a Francophone newspaper. A Dutch translation was published in 1903, introducing the expression 'poor Flanders': A. De Winne, *Door Arm Vlaanderen* (Ghent 1903).

3 C. Vandembroeke, *Hoe rijk was arm Vlaanderen? Vlaanderen in de 18^{de} eeuw. Een vergelijkend overzicht* (Bruges 1995) 135.

4 For the purchasing power and consumption at the national Belgian level, see: G. Bekaert, 'Caloric consumption in industrializing Belgium', *The Journal of Economic History* 51 (1991) 633-635; J. Blomme, 'De hoofdelijke broodgraanconsumptie in België, 1850-1939', *Tijdschrift voor Sociale Geschiedenis* 12 (1986) 401-415; P. Scholliers, *Arm en rijk aan tafel: tweehonderd jaar eetcultuur in België* (Berchem 1993); Y. Segers, *Economische groei en levensstandaard. Particuliere consumptie en voedselverbruik in België, 1800-1913* (Leuven 2003); Y. Segers, 'Nutrition and living standards in industrializing Belgium (1846-1913)', *Food & History* 2 (2004) 153-178; for indicators at the district level, see: I. Devos, *Allemaal beestjes. Mortaliteit en morbiditeit in Vlaanderen. 18de-20ste eeuw* (Ghent 2006); N. Deschacht and A. Winter, 'Rural crisis and rural exodus? Local migration dynamics during the crisis of the 1840s in Flanders (Belgium)', *Explorations in Economic History* 56 (2015) 32-52; and for living standards at the urban level, see: I. Devos and T. Van Rossem, 'Urban health penalties. Estimates of life expectancies in Belgian cities 1846-1908', *Journal of Belgian History* 45 (2015) 74-109; G. De Vos, *De voedingstoestand te Brugge (1800-1860). Een bijdrage tot de studie van de levensstandaard* (Unpublished MA thesis, Ghent University 1984); D. Mareska and J. Heyman, *Enquête sur le travail et la condition physique et morale des ouvriers employés dans les manufactures de coton, à Gand* (Ghent 1845); C. Vandembroeke, 'Kwantatieve en kwalitatieve aspecten van het vleesverbruik in Vlaanderen', *Tijdschrift voor Sociale Geschiedenis* 9 (1983) 221-257.

5 J. Komlos, 'Stature and nutrition in the Habsburg monarchy: the standard of living and economic development', *American Historical Review* 90 (1985) 1149-1161.

tional monetised data such as per capita income have proved inadequate in answering questions about historical living standards.⁶ As health is so important to the quality of life, it is now customary to refer to the 'biological standard of living'.⁷

I use adult height in this article as an indicator of socio-economic conditions and well-being during childhood. Although the interpretation of differences or changes in height is not straightforward because of the wide range of factors that can influence growth between conception and adulthood, heights are now accepted in the scientific community as a useful measure of prosperity and poverty.⁸ Here, I collected data on the heights of about 3,000 male prisoners born in rural Flanders between 1830 and 1870. A problem inherent in prison records is that they are more representative of the lower ranks of society. Still, in this case this bias is a benefit because the lower classes are assumed to be more vulnerable to economic developments.⁹ The main advantage of using heights to gauge living standards is that they enable to disaggregate the populations geographically and socially. Prisoners' heights can in fact inform us about which specific groups were at the bottom of society in ways that an aggregated series cannot.

This article examines regional height differences in rural Flanders based upon the hypothesis developed by the American economist John Komlos, which states that the average stature of a population decreases when agricultural production is more orientated to the market.¹⁰ Komlos argues that an increasing dependency on the food market leads to lower overall nutritional intake, especially when combined with rapid population growth. The nutritional status of a population in a market-oriented economy is considered to be more vulnerable to price shocks, with high prices translating into smaller adult heights through nutritional deprivation in childhood. Komlos developed this argument for the eighteenth-century Habsburg monarchy

6 For a general overview of the argumentation of anthropometric economic history, see: J. Komlos and J. Baten, 'Looking backward and looking forward', *Social Science History* 28 (2004) 191-210; R. Steckel, 'Heights and human welfare: recent developments and new directions', *Explorations in Economic History* 46 (2009) 1-23; I. Kelly and J. Komlos, 'Introduction', *The Oxford Handbook of Economics and Human Biology* (Oxford 2016) 3-8.

7 R. Steckel, 'Biological measures of the standard of living', *Journal of Economic Perspectives* 22 (2008) 129-152.

8 R. Floud, R. Fogel, B. Harris and S. Hong, *The changing body: health, nutrition, and human development in the western world since 1700* (Cambridge 2011); Steckel, *Height and human welfare*, 11; D. Meredith and D. Oxley, 'Blood and bone: body mass, gender and health inequality in nineteenth-century British families', *The History of the Family* 20 (2015) 204-230, 205.

9 Komlos and Baten, 'Looking back and looking forward', 193.

10 Komlos, *Nutrition and economic development*, 106.

using heights from Austrian military sources. The question remains whether a similar pattern can be observed in a smaller region such as rural Flanders. Within rural Flanders, we can distinguish two different production systems, often referred to as social agrosystems: the commercial business economy of coastal Flanders and the commercial survival economy of inland Flanders, including the proto-industrial linen districts.¹¹ Under Komlos's hypothesis, I expect the average stature in the more market-oriented economic system of coastal Flanders to be smaller than in the more market-independent system of inland Flanders.

Using this regional approach, I then investigate which particular groups were at the bottom of society, by examining the evolution of heights for several occupational groups in rural Flanders between 1830 and 1870. A regional aggregated analysis can hide important differences between occupational groups if the occupational distributions are unequal. By focusing on low-skilled workers, by far the largest group of prisoners, the height data will show which families in rural Flanders had the worst living conditions for growing children. Anthropometric evidence, in other words, will provide a nuanced view of the impact of economic developments and provide a more complete picture of the quality of life in rural Flanders.

This article starts with an outline of the origin of the variations between coastal and inland Flanders, followed by a section dedicated to regional variations in the economic development during the nineteenth century. Next, I discuss how this regional diversity can be expected to translate into height differences. Then I describe the judicial background and profiles of the prisoners in the sample, before turning to the height data and the limitations and corrections performed on the dataset. Subsequently, the results of the height analyses for coastal and inland Flanders are presented, first by focusing on the regional diversity and secondly by examining specific occupational groups.

2 Regional variations in rural Flanders

Rural Flanders cannot be defined as a single region. Recent studies have identified important differences, often aided by the concept of 'social

11 E. Thoen, "Social agrosystems" as an economic concept to explain regional differences. An essay taking the former county of Flanders as an example (Middle Ages-19th. century); in: B. Van Bavel and P. Hoppenbrouwers, *Landholding and land transfer in the North Sea area (late Middle Ages-19th century)* (Turnhout 2004) 47.

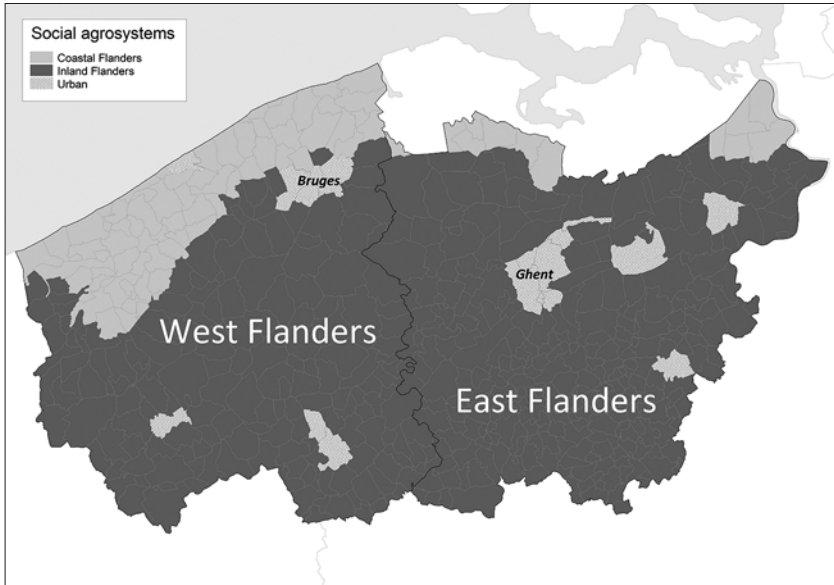
agrosystem'.¹² The term 'agrosystem' was coined by Michael Mitterauer in 1992 in order to take into account the geological components of the economy of a specific region. Erik Thoen broadened this framework to embrace the social and demographic aspects of a rural economic system. Central to the framework are the rural production systems which are determined by a range of economic characteristics and not by political borders. The social agrosystem is defined as 'a rural production system based on the region-specific social relations involved in the economic reproduction of a given geographical area'.¹³ In his introductory essay on the concept, Thoen distinguished between two different regions in the former county of Flanders, namely coastal Flanders and inland Flanders. The soils in coastal Flanders are mainly composed of heavy marine clays, whereas those in inland Flanders are mostly lighter sandy and sandy-loamy soils. The two regions evolved in divergent ways after the Late Middle Ages. Coastal Flanders developed into a society dominated by large farms, whereas smallholdings dominated the sandy soils of inland Flanders.¹⁴

Historically, social property relations had differed between the regions. In coastal Flanders, the so-called polders, lease holding was predominant and small independent peasant farm owners were steadily driven from their properties. From the fourteenth century onwards, there was a slow but gradual concentration of farmland until finally large farms dominated the region. This process was intensified by growing ecological pressures. Many peasants could not afford the high costs of maintaining the infrastructure

12 Earlier work based on social agrosystems includes: E. Thoen, 'A "commercial survival economy" in evolution. The Flemish countryside and the transition to capitalism (Middle Ages-19th century)', in: P. Hoppenbrouwers and J.L. van Zanden, *Peasants into farmers? The transformation of rural economy and society in the Low Countries (middle ages-19th century) in light of the Brenner debate* (Turnhout 2000) 102-157; T. Lambrecht, *Een grote hoeve in een klein dorp: relaties van arbeid en pacht op het Vlaamse platteland tijdens de 18^{de} eeuw* (Ghent 2002); T. Soens, *De spade in de dijk? Waterbeheer en rurale samenleving in de Vlaamse kustvlakte (1280-1580)* (Ghent 2009); S. De Langhe, M. Mechant and I. Devos, 'Regionale verschillen in het leven van ongehuwde moeders op het platteland in de Zuidelijke Nederlanden, 1730-1846', *Tijdschrift voor Sociale en Economische Geschiedenis* 8 (2011) 2-28; S. De Langhe, *Oude vrijsters: bestaansstrategieën van ongehuwde vrouwen op het Brugse platteland, late achttiende-begin negentiende eeuw* (Doctoral dissertation, Ghent University 2013); A. Winter and T. Lambrecht, 'Migration, poor relief and local autonomy: settlement policies in England and the Southern Low Countries in the eighteenth century', *Past and Present* 218 (2013) 91-126; L. Vervaeke, *Goederenbeheer in een veranderende samenleving: het Sint-Janshospitaal van Brugge, ca. 1275-ca. 1575* (Doctoral dissertation, Ghent University 2015); E. Thoen and T. Soens, 'The family or the farm: a Sophie's choice? The late medieval crisis in the former county of Flanders', in: J. Drendel (ed.), *Crisis in the later Middle Ages: beyond the Postan-Duby paradigm* (Turnhout 2015) 195-224.

13 Thoen, 'Social agrosystems' as an economic concept, 47.

14 *Ibid.*, 52-53.



Map 1: Social agrosystems in West Flanders and East Flanders. Source: *Map of agricultural regions in Belgium* (Belgian Ministry of Agriculture 1951, 1953, 1968)
 © Ghent University Quetelet Centre, LOKSTAT. Sven Vrielinck & Torsten Wiedemann.

needed to protect their land from the sea. Most farmers lost their property rights, resulting in numerous impoverished landless peasants who had to resort to selling their labour capacity to the larger holdings. The large farms of the polders were able to sell their products on international markets, a system referred to as a commercial business economy.¹⁵ Meanwhile, inland Flanders evolved in the opposite way. The most striking difference is the numerous smallholdings, many of which were even smaller than the minimum size required for sustaining a peasant family.¹⁶ In the long term, the subdivision of the holdings continued, making the smallholdings even smaller and pushing farmers to the edge of 'survival'.¹⁷ Many peasants succeeded in keeping full ownership of at least a part of their farmsteads, but they still had to rely on the food markets to some extent. This economic model is known as a commercial survival economy.

15 Most farm holdings in coastal Flanders were between 15 and 50 hectares. Thoen, 'A "commercial survival economy" in evolution', 102-157.

16 In the middle of the nineteenth century, more than 60 per cent of holdings in inland Flanders were smaller than 1 hectare. Thoen, 'A "commercial survival economy" in evolution', 114.

17 E. Vanhaute, *Heiboeren: bevolking, arbeid en inkomen in de 19de-eeuwse Kempen* (Brussels 1992).

The relationship between large farms and smallholdings largely determined the labour relations and labour organisation. For instance, the large farms in the polder regions would lend a part of their production capacity, especially horses, to the smaller farms in exchange for labour. In inland Flanders, peasants were forced to find an additional non-agricultural income through proto-industrial activities. Whereas these activities were almost non-existent in the coastal region of Flanders, in the mid-nineteenth century up to 71 per cent of the active population at the heart of the linen region in inland Flanders were at least partly involved in proto-industrial activities.¹⁸

3 Regional variations in the nineteenth century

During the first half of the nineteenth century, the demand for handmade rural linen fell rapidly on the domestic and foreign markets, mainly as a result of competition from inexpensive mechanised cotton textiles from England. On top of this, consecutive harvest failures of both potato and grain crops led to a severe agricultural crisis, accompanied by a series of epidemics, which made life in rural villages and small towns during the 1840s even more precarious. The daily nutritional intake in inland and coastal Flanders dropped to an alarming level, putting living standards under severe stress.¹⁹ The decline in living standards in the second half of the 1840s is reflected by the increasing need for poor relief in the countryside. In East Flanders, the inland province, the number of people supported by poverty boards doubled in the late 1840s to a quarter of the population. In West Flanders, the coastal province, the proportion was even higher, rising to about 35 per

18 C. Vandebroeke, 'Le cas flamand: évolution sociale et comportements démographiques aux XVIIe-XVIIIe siècles', *Annales. Économies, Sociétés, Civilisations* 39 (1984) 917.

19 For nutritional intake, see: Bekaert, 'Caloric consumption in industrializing Belgium'. In comparison to other European countries, the Flemish potato fields were affected very early by the potato blight, resulting in a dramatic impact on the harvest. About 85 to 95 per cent of the yield was lost in 1845, and in subsequent years the potato crop yielded only about half the normal quantities. Up to 66 per cent of the normal nutritional availability in Flanders was lost due to combined harvest failures of potatoes and bread grains. The good grain harvest in 1847 and the reasonable yields in subsequent years were barely sufficient to avoid a general famine in Flanders. See: G. Jacquemyns, *Histoire de la crise économique des Flandres, 1845-1850* (Brussels 1929) 258-259; E. Vanhaute, "So worthy an example to Ireland". The subsistence and industrial crisis of 1845-1850 in Flanders, in: R. Paping, E. Vanhaute and C. O'Grada, *When the potato failed. Causes and effects of the 'last' European subsistence crisis, 1845-1850* (Turnhout 2007) 123-148, 131.

cent.²⁰ Some peasants opted for emigration from the impoverished villages, which experienced very high mortality in 1846-1847 due to a combination of hunger and infectious diseases, especially typhus.²¹ After 1849, the nutritional supply and disease environment for the children in Flanders seemed to recover to pre-crisis levels, but between 1853 and 1856 grain prices rose to levels that were even higher than in 1847.²² Again, the crisis was accompanied by rising mortality. In 1854, a new cholera epidemic struck Flanders and smallpox claimed many victims as well.²³ These harvest shocks and price shocks were experienced differently in the two regions because of the differences in agricultural organisation, which saw large groups of landless wage labourers working on the farms of coastal Flanders and smallholders predominating in inland Flanders. In inland Flanders, the possibility of relying on informal exchange networks and the village community was crucial to overcoming economic difficulties, as demonstrated by Lambrecht and Vanhaute.²⁴ After 1860, the availability of food increased substantially in both inland and coastal Flanders, but the diet remained poor and monotonous.²⁵ Mortality declined significantly after 1850, despite a major setback due to a massive outbreak of cholera in 1866.²⁶ Between 1846 and 1880 life expectancy at birth in Belgium rose from about 37 years to 42 years.²⁷

The modernisation of agricultural production in the second half of the nineteenth century reduced historical differences within rural Flanders, but inland and coastal Flanders continued to have their own specific rural production systems until the early twentieth century. Agricultural production was organised along different lines, with produce destined for different purposes. In inland Flanders, the majority of households cultivated some land, mostly smaller than 2 ha and partly under leasehold.²⁸ Although rural

20 L. Van Molle, *Katholieken en landbouw: landbouwpolitiek in België 1884-1914* (Leuven 1989) 24; Deschacht and Winter, 'Rural crisis and rural exodus?', 42.

21 Deschacht and Winter, 'Rural crisis and rural exodus?' 47; Devos, *Allemaal beestjes*, 110-114 and figure 3.2 (115).

22 W. Ronsijn, 'Mediated and unmediated market dependence in the Flemish countryside in the nineteenth century: two paths of rural development', *Continuity and Change* 28 (2013) 89-120.

23 Devos, *Allemaal beestjes*, 128.

24 E. Vanhaute, T. Lambrecht, 'Famine, exchange networks and the village community. A comparative analysis of the subsistence crisis of the 1740s and the 1840s in Flanders', *Continuity and Change* 26 (2011) 155-186.

25 Segers, *Economische groei en levensstandaard*, 285.

26 Devos, *Allemaal beestjes*, 28.

27 Devos and Van Rossem, 'Urban health penalties', 92.

28 Thoen and Vanhaute, 'The "Flemish Husbandry" at the edge', 275.

linen production was strongly oriented towards national and international markets, food production on these small farms was intensive, but not intended for commercialisation. As such, the inland economy was predominantly market-independent. In contrast, agricultural production in coastal Flanders was organised by large farms that employed landless agricultural workers and produced mainly cereals and dairy produce for the market. As a result, the landless proletariat were heavily market-dependent.²⁹ Recent studies by De Langhe, De Veirman, Devos, Mechant and Matthys have shown that these rural production systems were also characterised by specific demographic patterns with regard to marriage, fertility and mortality.³⁰ The market-oriented economy of coastal Flanders was characterised by considerable social polarisation, which made for instance unmarried mothers vulnerable to economic and social challenges.³¹ In the following sections of the article, I examine whether there were also differences in the height patterns of the two systems.

4 Regional variations and heights

All the evidence so far suggests a strong need for nuance and regional differentiation when studying living standards in the Flemish countryside. Such regional differences are well-established in the international anthropometric literature. Most historical studies show that secular height trends and regional variations in stature are correlated with economic growth and/or general living conditions. For instance, men born during the nineteenth century in the northern provinces of Italy were substantially taller than those from the south of the country.³² Moreover, men born in the country-

29 Thoen, 'A "commercial survival economy" in evolution', 102-157.

30 See De Langhe, *Oude vrijsters*; S. De Langhe, 'To thrive, one must wive? Subsistence strategies of single women in eighteenth- and early nineteenth-century rural Flanders', *History of the Family* 17 (2012) 199-219; I. Devos, S. De Langhe and C. Matthys, 'Lost in registration? Missing occupations of single women in the Bruges countryside, c.1814', *History of the Family* 19 (2014) 1-20; C. Matthys, *Sex and the city. Servants and the diffusion of fertility control in Flanders, 1830-1930* (Doctoral dissertation, Ghent University 2012); Devos, *Allemaal beestjes*; De Langhe, Mechant and Devos, 'Regionale verschillen'; M. Mechant et al., 'Mogelijkheden en beperkingen van de levensloopanalyse voor het vroegmoderne demografisch onderzoek in Vlaanderen', in: K. Matthijs, J. Kok and H. Bras, *Leren van historische levenslopen: historisch-demografisch onderzoek in Vlaanderen en Nederland* (Leuven 2012) 75-96.

31 De Langhe, Mechant and Devos, 'Regionale verschillen in het leven van ongehuwde moeders', 27.

32 E. Arcaleni, 'Secular trend and regional differences in the stature of Italians, 1854-1980', *Economics & Human Biology* 4 (2006), 24-38, fig. 3.

side were generally taller than those born in cities.³³ In the first half of the nineteenth century, the average stature of conscripts from the urban provinces in the Netherlands was about 2 cm smaller than those from Dutch rural regions.³⁴ In Belgium as well, important regional differences in height were observed in the nineteenth century. Measurements recorded in 1880-1882 reveal that conscripts from the Flemish provinces in the north, the poorest area of the country, were about 1 to 2 cm taller than conscripts from the Walloon provinces in the south, who were more affluent.³⁵ Furthermore, conscripts born in the province of West Flanders had an average stature of 166.3 cm, whereas conscripts from the inland province of East Flanders measured on average 165.8 cm.³⁶ This small 'coastal' advantage, however, masks possible urban-rural and intraprovincial differences.³⁷ It is therefore necessary to look beyond administrative borders such as provinces and compare regions that are based upon their rural production system.

In order to truly assess regional variations within nineteenth-century rural Flanders, I focus on the heights of prisoners, distinguishing between individuals born in coastal Flanders and inland Flanders, but excluding those born in urban areas.³⁸ There are three reasons for expecting the average stature in coastal Flanders to be smaller than in inland Flanders. The first is based on an argument known in historical anthropometry as the Komlos hypothesis, which states that the average height of a population declines when this group is more involved in the market. When peasants become integrated into the market, the argument goes, the cost of food for

33 D. Oxley, 'Living standards of women in pre-famine Ireland', *Social Science History* 28 (2004) 271-295, 272.

34 V. Tassenaar, *Het verloren Arcadia. De biologische levensstandaard in Drenthe, 1815-1860* (Capelle a/d IJssel 2000) 289.

35 E. Houze, 'La taille, la circonférence thoracique et l'angle xiphoidien des Flamands et des Wallons', *Bulletin de la Société d'Anthropologie de Bruxelles* (Brussels 1887) 298.

36 Houze, *La taille*, 298.

37 My previous research on convicts born in the West Flemish countryside between 1780 and 1810 confirms the small height advantage. E. Depauw, *De lichaamslengte van gevangenen. Een antropometrische studie. Casus: de centrale gevangenis van Gent, 1832-1840* (Unpublished MA thesis, Ghent University 2012) 142; E. Depauw, 'Grote gangsters of klein gespuis? De lichaamslengte in de Gentse gevangenis in de negentiende eeuw', *Handelingen van de maatschappij voor geschiedenis en oudheidkunde te Gent* (Ghent 2012) 145-173.

38 The individuals born in the cities with more than 15,000 inhabitants (Ghent, Bruges, Sint-Niklaas, Aalst, Ypres, Lokeren, Kortrijk and Ostend) were excluded from this analysis. Based upon the dataset, a small urban height penalty for the cities of West Flanders was observed in a previous study, but the crisis of the 1840s seems to have impacted urban heights less than rural heights. See: E. Depauw, *Urban height penalties and the crisis of the 1840s in West Flanders*, unpublished paper for the 8th Day of Historical Demography (Groningen 2015) 10.

the household increases. Those working as landless labourers on the larger farms geared to commercial production become increasingly dependent on the food they have to buy, according to the logic of supply and demand. This move away from self-sustaining smallholdings eventually leads to a reduction in the quality of food intake and a lower nutritional status of the population. The end result is a decrease in the average stature of the population.³⁹ Komlos developed this hypothesis based upon the height evolution of the Habsburg empire, but there is no reason to suspect his argument does not hold for smaller regions. As stated above, in coastal Flanders, a commercial business economy, the large farms mainly sold their produce to the markets and the wage labourers had to rely on the markets for their food supply. In inland Flanders, a commercial survival economy, most peasants were able to keep full ownership of at least a part of their farmstead to grow their own food. Although these farms were often too small to fully sustain the household, the farmers were less dependent on the markets for food supply.⁴⁰ In fact, research based on military registers for the early nineteenth century has already shown that agricultural workers in Westhoek, the southern corner of coastal Flanders, were on average 2 cm shorter than their inland counterparts. Most farms in this area were market-oriented, which is clearly in line with the Komlos hypothesis.⁴¹

Secondly, data at the provincial level for the Netherlands support the expectation of a smaller average stature in the coastal area. Measurements recorded by the military show a consistent height deficit for the Dutch coastal provinces for the period 1820 to 1860. Interestingly, Tassenaar distinguishes between two rural economic systems, more or less comparable to the Flemish social agrosystems.⁴² The coastal provinces (labelled by Tassenaar as rural modern), consisting of clay soils, showed similarities to the Flemish commercial business economy, with the farms largely integrated into the markets. In the inland provinces, the populations were less dependent on the markets since they could at least partly meet their needs by growing food in their own fields.⁴³ These inland provinces, labelled rural

39 Komlos, *Nutrition and economic development*, 106.

40 Nevertheless, a large number of new markets were also set up in the countryside in inland Flanders during the first half of the nineteenth century. See: W. Ronsijn, 'Smallholders, spinners, weavers and the "scarcity of markets" in the Flemish countryside, c. 1780-1850: Motivations behind the multiplication of periodic markets', *Rural History* 25 (2014) 39-60.

41 K. Vanheuverbeke, *Een sociaal-economische comparatieve analyse op basis van antropometrische indicatoren: een statistische doorlichting voor de Franse Tijd* (Unpublished MA thesis, Ghent University 1997) 13.

42 Tassenaar, *Het verloren Arcadia*, 289.

43 Tassenaar, *Het verloren Arcadia*, 78.

traditional, are comparable to the commercial survival economy of inland Flanders. The heights in the rural modern region/coastal provinces for men born between 1800 and 1840 were on average 0.5 to 1 cm smaller than for men in the rural traditional region/inland provinces, thus confirming the Komlos hypothesis.⁴⁴

Finally, coastal Flanders was highly polarised between large and small farmers and between a land-owning group and a landless underclass.⁴⁵ The large group of poor landless people in coastal Flanders is another reason for expecting the average stature to be smaller than in inland Flanders. It is also more likely that these men were involved in petty crime and thus overrepresented in the prison sample.

However, three arguments can also be put forward for the opposite result, i.e. taller men in coastal Flanders. First, fishing could have provided an additional source of calories beneficial to average stature. However, after the completion of the railway to Ostend in 1838, fish could easily be transported to inland Flanders as well. More importantly, the meadows of coastal Flanders were home to more cattle than the sandy soils of inland Flanders. In the coastal area there were about 400 head of cattle per 1,000 inhabitants, 50 per cent of which were dairy cows. The smallholdings in inland Flanders had about half that number.⁴⁶ According to the milk hypothesis of the German economist Jörg Baten, regions specialising in milk production displayed an overall height benefit, because dairy protein is very beneficial to human growth.⁴⁷ Still, in coastal Flanders most of the dairy produce was not used for local consumption. For instance, the important butter industry, which had a surplus production of about 75 per cent, was oriented towards trade.⁴⁸ Finally, the crises in the rural linen industry could explain a temporal coastal height advantage.⁴⁹ Since proto-industrial activities were mainly concentrated in inland Flanders and came under severe pressure during the period under research, a negative effect on the biological stand-

44 Inland provinces labelled as rural traditional: data from Noord-Brabant, Limburg and Drenthe. Coastal provinces labelled as rural modern: data from Zeeland and Groningen. Tassenaar, *Het verloren Arcadia*, 289.

45 De Langhe, *Oude vrijsters*, 32.

46 Calculations based upon the 1846 census, obtained from LOKSTAT, Ghent University (www.lokstat.ugent.be).

47 J. Baten, 'Protein supply and nutritional status in nineteenth century Bavaria, Prussia and France', *Economics & Human Biology* 7 (2009) 165-180.

48 L. Hoornaert, *Boter en kaas in de kasselrij Veurne (16de-19de eeuw)* (Unpublished MA thesis, Ghent University 1997) 169.

49 Vandenbroeke, *Le cas flamand*, 917.

ard of living in the inland region can be expected. As explained in the next section, the majority of the prisoners in the sample were born outside the heartland of the proto-industrial linen industry.

5 The sample: prisoner profiles

In this article, the biological standard of living in rural Flanders is studied based upon the records of prisoners, a population group with specific characteristics. The sample comes from the prison registers of Ghent and Bruges, where the height of each convict was measured when they entered the prison. The information registered also included the individual's surname, first name, date of incarceration, sex, age, occupation, place of birth, place of residence and the reason for the conviction.⁵⁰

The judicial history of Ghent prison dates back to the correction house founded in 1773. In the nineteenth century it had a double function. First, it served as one of the two central prisons of Belgium that held criminal convicts with long sentences. Secondly, the prison was also the institution for those serving correctional sentences in the district of Ghent. Here, I use the data from the latter. Due to capacity problems these prisoners moved to a new adjoining building during the second half of the nineteenth century.⁵¹ Bruges prison also dates back to the eighteenth century and it became the central institution for the detention of men and women convicted of correctional law offences in the district.⁵² The allocation of prisoners was regulated by the 'Code pénal' of 1810, which distinguished between police, correctional and criminal punishments. A prison was chosen or erected in every judicial district to take in convicts receiving police and correctional sentences, which could be up to five years of imprisonment. The vast majority of sentences did not exceed a month. The revised 'Code pénal' of 1867 did little to alter this situation, though it did mean that sentences imposed by the police court could no longer exceed seven days.⁵³ More than half of the prisoners in the sample used (52 per cent) were convicted of minor assault and battery. Usually they had to pay a fine or they were imprisoned for a few days. The second most common conviction was pet-

50 Information on convictions was only recorded for Bruges prison.

51 G. Martyn and K. Velle, *150 jaar Nieuwewandeling: gevangenis Gent (1862-2012)* (Ghent 2011).

52 W. Ducheyne, *De gevangenis aan het Pandreitje te Brugge 1689-1989* (Bruges 1989) 59-76.

53 J. Monballyu, *Zes eeuwen strafrecht: de geschiedenis van het Belgische strafrecht (1400-2000)* (Leuven 2006) 141-143.



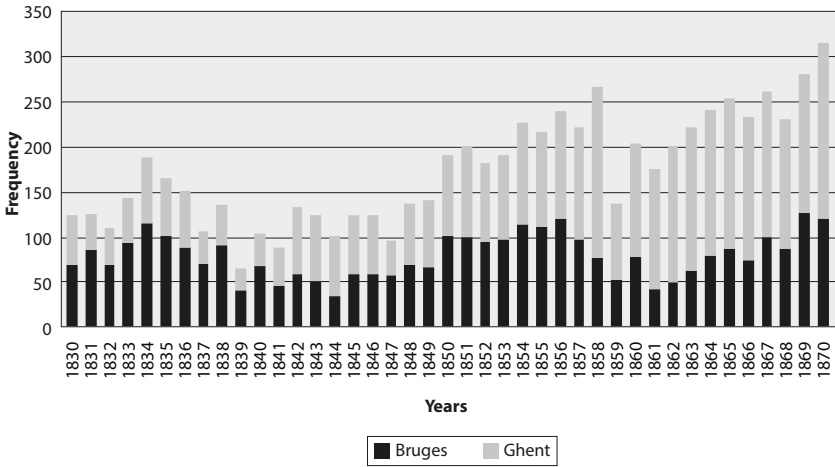
Illustration 1: Postcard of the nineteenth-century Ghent prison, viewed from the Coupure. This building was closed in 1935 and demolished shortly afterwards. An adjoining new prison building was erected in 1862, called Nieuwe Wandeling, and is currently still serving as Ghent prison. (Image by Th. van den Heuvel, collection: De Zwarte Doos, stadsarchief Gent, SCMS_PBK_0555.)

ty theft (14 per cent). Other recurrent crimes include vagrancy, begging, poaching and hunting offences.

I sampled all new prisoners entering the prisons of Ghent and Bruges in specific years. For Bruges, the prisoners selected were those admitted between 1856 and 1858, 1876 and 1878, and 1898 and 1902. For the somewhat bigger Ghent prison, all the prisoners from 1858, 1878 and between 1890 and 1893 were included in the study. In this way, it was possible to reconstruct consecutive birth cohorts for the period 1830-1870 (see Figure 2).

Analysing the prison data provides insights into the specific characteristics of this population group, such as their geographical distribution, age composition and occupational structure. In total, the dataset for this article consists of 3,341 unique male prisoners born in the provinces East and West Flanders, divided between those born in the inland and coastal region. Within this sample, 1,654 convicts were measured in Bruges prison and 1,687 individuals were measured in Ghent prison. Although the prisons of Ghent and Bruges were the two largest penal institutions in East and West Flanders, their recruitment area was limited to their respective judicial districts. This has some important consequences for the geographi-

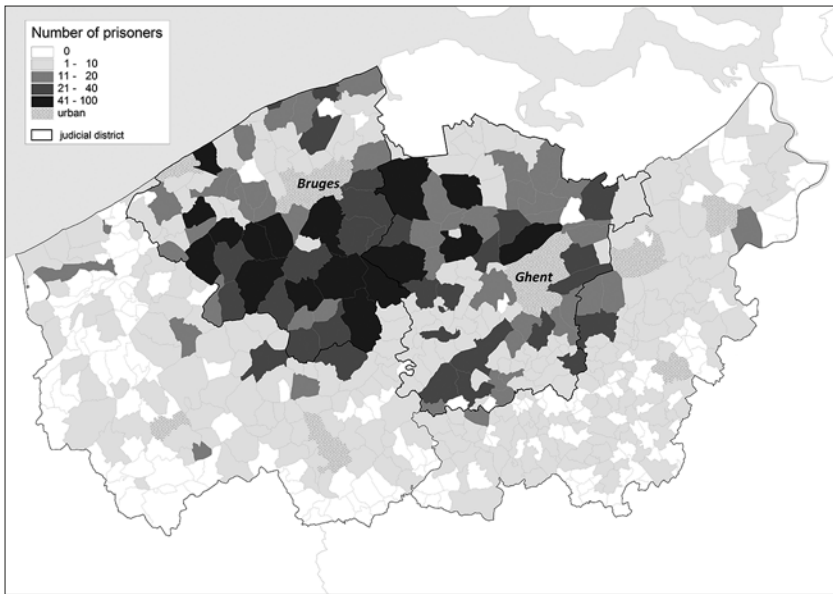
Figure 2. Distribution of individuals according to birth year and prison, 1830-1870



Source: Dataset of prisoners from Bruges and Ghent. Bruges: State Archives Bruges (RAB), Prison Archive Bruges (SI Bruges 1999), Enrolment registers (inschrijvingsrollen), 1376-1378, 1389-1394 and 1418-1423. Ghent: State Archives Ghent (RAG), Prison Archive Ghent (SI Ghent 1999), Enrolment registers (inschrijvingsrollen), 3486-3487, 3517-3520 and 3554-3565.



Illustration 2: Photograph of the courtyard of the Bruges prison, Pandreitje, after the closure of the prison in 1992. Shortly afterwards, the construction was demolished and replaced by residential buildings (Image by J. Termont, collection: stadsarchief Brugge (www.beeldbankbrugge.be), FOB04896.)



Map 2. Geographical distribution of the prisoners in the sample according to the place of birth. © Ghent University Quetelet Centre, LOKSTAT. Sven Vrielinck & Torsten Wiedemann.

cal distribution of the prisoners, since most individuals were also born in these districts. The dataset is therefore biased towards the northern regions of both provinces, the geographical area close to the two prisons under study, as shown in Figure 3.⁵⁴ This bias does not make comparison between coastal and inland Flanders impossible, but reduces the number of prisoners that were active as textile worker, since the heartland of the rural linen production was situated mainly outside the judicial territory of the courts of the two cities.

As explained in the data section below, only adult prisoners aged between 25 and 50 were considered for this study. Still, the majority of the prisoners were young men, with 32 per cent aged between 25 and 29 and another 26 per cent aged between 30 and 34. Their socio-economic background can only be determined based upon the occupation stated on arrival at the institution. The most common occupational titles of the prisoners were day labourer (20 per cent), agricultural worker (16 per cent), workman (10 per cent)

54 Data on individual prisoners for the prisons of Kortrijk, Oudenaarde and Ypres are not available for the nineteenth century. Additional data is available for the prisons of Dendermonde (State Archive Ghent) and Veurne (State Archive Bruges).

and weaver (5 per cent). The samples from the prisons of Bruges and Ghent are very similar in terms of age composition and occupational structure.

The sample: height data

The Belgian prison service has records of height data from 1832 onwards, as new registers were introduced in the institution after Belgian independence in 1830. All new arrivals at the penal houses were recorded chronologically by the prison officials. Convicts' heights were recorded to help with identification in case of escape.⁵⁵ A number of reductions and corrections were applied to the original dataset, which resulted in a final sample of 3,341 prisoners.

First, although women were present in both the prisons of Bruges and Ghent, their numbers are not sufficient to calculate reliable estimates of female height across geographical and occupational groups in rural Flanders. Secondly, the analysis of adult stature is limited to the group aged 25-50 (inclusive). The lower boundary excludes individuals that are still growing. The upper boundary was chosen because fully-grown adult stature does not remain constant as people age. A slight shrinkage starts between the ages of 30 and 40 and is known to be about 0.5 to 1.0 cm around the age of 50.⁵⁶ Thirdly, only prisoners born in the provinces of East Flanders and West Flanders were used. Fourthly, recidivism rates in nineteenth-century prisons were high, leading to multiple incarcerations of the same individual.⁵⁷ Since most sentences were limited to a few days of imprisonment, repeated incarceration of individuals over a short time period was common. Therefore, based on the recorded place of birth, a linkage of entries for individuals with the same name was executed. For each possible link, the Levenshtein distance (nearest string algorithm) was calculated and all scores above 0.5 were checked manually. The results show that more than half of the observations belonged to a recidivist. For each positive match, I only added one observation to the final dataset. The information recorded on the registration date that was closest to the individual's 35th birthday was retained.⁵⁸

55 *Recueil des circulaires, instructions et autres actes. Emanés du ministère de la justice ou relatifs à ce département. Troisième série, 1830-1835* (Brussels 1851) No. 221.

56 J. Sorkin, D. Muller and R. Andres, 'Longitudinal change in height of men and women: implications for interpretation of the body mass index: the Baltimore longitudinal study of aging', *American Journal of Epidemiology* 150 (1999) 969-977.

57 D. Fyson and F. Fenchal, 'Prison registers, their possibilities and their pitfalls: the case of local prisons in nineteenth-century Quebec', *The History of the Family* 20 (2015) 163-168, 172.

58 The entry closest to the 35th birthday is chosen for prisoners with multiple records. Both height and occupational information is most informative around this age.

Fifthly, the average height of prisoners was checked by registration year and by prison, controlling for differences in measurement techniques. An important concern is whether the prisoners were measured with or without shoes and how this differed between the prisons and the sample years. There is no written evidence to provide a definitive answer to this issue, since the official communications contain no mention of the exact measurement technique used in the registration procedure. In the last sample period, the height measurements from the two prisons were in line with each other, but the measurements of convicts in 1858 and 1878 in Ghent prison were considerable larger than in Bruges. The height measurements were generally between 1.5 and 2 cm larger than the expected height distribution, compared to the data from Bruges and reference points from military recruits. There seems to be some kind of measurement error operating here, especially since the female height data from the same registers show a similar upsurge. The most likely potential problem is that the Ghent data of 1858 and 1878 are overestimated because convicts were measured with shoes on. Inwood and Roberts suggest that men's shoes or boots can easily add 2 to 3 cm to measured heights.⁵⁹ For comparable nineteenth-century data from a Portuguese prison, a correction of 1.5 cm for the shoes of prisoners was proposed.⁶⁰ For this analysis, 1.5 cm was deducted from the reported heights of the prisoners concerned to correct for the potential measurement error, but since no written evidence was found to support the assumption of measurements with shoes on, the sensitivity was checked by using models with and without different sizes of correction.

Finally, the frequency distributions of the sample clearly show that the data suffer from rounding, evident in heaping on heights ending in 0 or 5. Figure 4 shows that height heaping is apparent for 160, 165 and 170 cm. This is a common feature of height data and is not usually perceived as a problem.⁶¹ For instance, Mokyr and O'Grada claim that height heaping does not bias their estimates, but only reduces the precision.⁶² According to Wright and Bray, data heaping presents a great challenge, because it can seriously

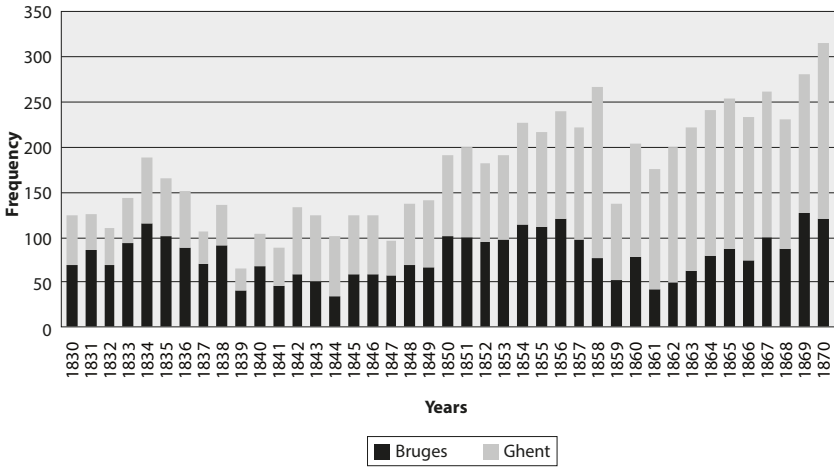
59 K. Inwood and E. Roberts, 'Longitudinal studies of human growth and health: a review of recent historical research', *Journal of Economic Surveys* 24 (2010) 801-840, 829.

60 Ferraz de Macedo used data on 200 prisoners that escaped from a Portuguese prison in 1847. He deducted 1.5 cm for their shoes. F. Ferraz de Macedo, *Os criminosos evadidos da Cadeia Central do Limoeiro a 29 de abril de 1847* (1901).

61 J. Komlos, 'How to (and how not to) analyze deficient height samples', *Historical Methods: A Journal of Quantitative and Interdisciplinary History* 37 (2004) 160-173.

62 J. Mokyr and C. O'Grada, 'Height and health in the United Kingdom 1815-1860: evidence from the East India Company army', *Explorations in Economic History* 33 (1996) 141-168, 149.

Figure 4: Frequency distribution of male heights in the prisons of Ghent and Bruges



Source: Dataset of prisoners from Bruges and Ghent, see Figure 2.

distort the results obtained if no corrections are made.⁶³ This problem was described by Preece and Baines in 1978 and has recently been discussed by Wang.⁶⁴ To control for this potential measurement error introduced by height heaping, the average height of the prisoners was calculated with all the observations terminating in 0 or 5 cm weighted down by 50 per cent.⁶⁵

Heights in coastal and inland Flanders

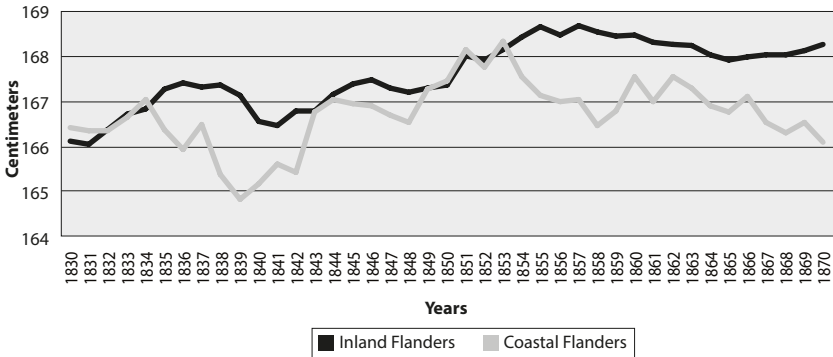
The average height of the male prisoners born in this sample was calculated for each birth year and shows strong differences between the height trend of men born in the coastal polder region and the height trend of men born in inland Flanders, as shown in Figure 5. The average stature of male prisoners in inland Flanders increased between 1830 and 1870 from about 166 cm to 168 cm, while male prisoners from coastal Flanders were on average

63 D. Wright and I. Bray, 'A mixture model for rounded data', *Journal of the Royal Statistical Society: Series D (The Statistician)* 52 (2003) 3-13, 4.

64 M. Preece and M. Baines, 'A new family of mathematical models describing the human growth curve', *Annals of Human Biology* 5 (1978) 1-24; H. Wang, *Statistical methods for heaped data*, dissertations available from ProQuest. Paper AAI3395726 (2009).

65 About 50 per cent of the observations in the dataset terminated in 0 or 5 cm. They were weighted down by 50 per cent in the calculation of average heights to correct for this overrepresentation.

Figure 5: Height trend per social agrosystem (cm), 5-year moving average



Source: Dataset of prisoners from Bruges and Ghent, see Figure 2. Time periods are calculated birth cohorts.

shorter, particularly those born during the 1830s and from 1855 onwards.

According to the Komlos hypothesis, the average stature in coastal Flanders, a commercial business economy, is expected to be smaller than in inland Flanders, a commercial survival economy. Table 1a shows the average stature in coastal and inland Flanders. Prisoners born in inland Flanders were on average 1.0 cm taller than prisoners born in the coastal area. The difference is evident for each birth decade, varying from about 0.3 cm to 1.4 cm. As stated in the data section, a correction was made for the assumption that prisoners in Ghent prison were measured with shoes on during certain years of admittance. Table 1b shows the average stature without this correction, widening the difference between the two regions primarily for the first birth decade.

The OLS regression models presented in Table 2 show that the difference between the two social agrosystems is significant (Model 1). Compared to prisoners born in the coastal area, prisoners from inland Flanders are 0.88 cm taller. This result is significant to the 0.1 per cent level. In a stepwise approach, some control variables were introduced in the subsequent models. First, the occupations of the prisoners were taken into account to control for variance in the occupational distribution of the sample (Model 2). The occupations were classified according to HISCO, and divided into social groups based on the historical class scheme HISCLASS.⁶⁶ HISCLASS uses twelve different occupational groups based on the economic sector and the

⁶⁶ M. van Leeuwen and I. Maas, *HISCLASS: a historical international social class scheme* (Leuven 2011).

Table 1a. Average stature of male detainees according to regional production system, born 1830-1870

	Coastal Flanders					Inland Flanders			
	Mean	N	STDV	VAR		Mean	N	STDV	VAR
1830-1840	165.7	113	6.42	412.5		166.7	509	6.30	397.1
1841-1850	166.7	113	5.12	262.4		167.0	661	6.15	378.1
1851-1860	167.4	104	6.06	367.2		168.2	675	5.37	288.8
1861-1870	166.7	229	5.59	312.6		168.1	937	5.64	317.8
Total	166.6	559	5.78	333.7		167.6	2,782	5.86	343.9

Table 1b. Average stature of male detainees according to regional production system, born 1830-1870, without corrections for measurement with shoes in Ghent prison

	Coastal Flanders					Inland Flanders			
	Mean	N	STDV	VAR		Mean	N	STDV	VAR
1830-1840	165.8	113	6.46	417.7		167.4	509	6.45	416.3
1841-1850	166.8	113	5.19	268.9		167.3	661	6.21	385.4
1851-1860	167.4	104	6.05	366.5		168.4	675	5.40	291.4
1861-1870	166.7	229	5.59	312.6		168.1	937	5.64	317.8
Total	166.7	559	5.79	335.5		167.8	2,782	5.89	347.4

Source: Dataset of prisoners from Bruges and Ghent, see Figure 2. Time periods are calculated birth cohorts.

level of skill necessary for the profession. Here the abbreviated scheme with five classes is used: elite (HISCLASS 1-2), lower middle class (HISCLASS 3-6), self-employed farmers and fishermen (HISCLASS 8), skilled workers (HISCLASS 7 and 9) and unskilled workers and farm workers (HISCLASS 10-13). The lower middle class is the reference group in the regression model. In anthropometric studies, the occupation of the individuals is often used to divide them into social groups. Their own socio-economic status is then used as a proxy for the socio-economic status of the family during growth and is based on the assumption of limited social mobility. Studies have shown that the occupation of a conscript in the nineteenth century was a good indicator of the socio-economic status of his father and therefore, if information at the family level is not available, the status of the conscript can be used.⁶⁷ Importantly, Model 2 (Table 2) shows that the introduction

67 J. Lantzch and K. Schuster, 'Socioeconomic status and physical stature in 19th-century Bavaria', *Economics & Human Biology* 7 (2009) 46-54, 53.

of the prisoners' occupations does not alter the height difference between the social agrosystems. Prisoners from inland Flanders are still about 0.87 cm taller on average than their counterparts from coastal Flanders, when controlling for their HISCLASS status. At the same time, the model shows that there were notable socio-economic height differences within the sample. This is not surprising since such socio-economic status differences are found almost universally in anthropometric studies.⁶⁸ Since most of the convicts came from the lowest social groups, they are largely classified as skilled or unskilled workers. There were almost no prisoners with an occupation from the elite HISCLASS group. As expected, there is a negative height effect associated with being a skilled worker (-0.3 cm) and an unskilled worker (-0.5 cm). Interestingly, farmers were on average taller than the other social groups. We can put forward several explanations to explain the height advantage of farmers, including the easier access to food supplies during childhood (including dairy products), the larger distance from the unhealthy urban disease environment and the more frequent exposure to sunlight and therefore increased production of vitamin D.⁶⁹

In the third model, the birth period of the prisoners is also taken into account. Compared to the average height of men born in 1870, prisoners born between 1830 and 1835 were significantly shorter. More importantly, the introduction of time into the model slightly reduces the height gap between the social agrosystems, indicating that the height difference is not constant over time. However, prisoners from inland Flanders remain about 0.83 cm taller than those from coastal Flanders, when controlling for their occupational class and birth period.

In the last model, the prison providing the data is introduced as a controlling variable. This is a dummy variable for convicts in Ghent prison compared to their counterparts in Bruges. Naturally, this variable explains a lot of the differences between the two social agrosystems, since the prisoners were distributed very unequally between the two institutions. A large share of the prisoners born in coastal Flanders were incarcerated in Bruges, whereas Ghent had far more prisoners born in inland Flanders.

68 J. Komlos and M. Baur, 'From the tallest to (one of) the fattest: the enigmatic fate of the American population in the 20th century', *Economics & Human Biology* 2 (2004) 57-74; G. Alter, M. Neven and M. Oris, 'Stature in transition: a micro-level study from nineteenth-century Belgium', *Social Science History* 28 (2004) 231-247; M. Manfredini, M. Breschi, A. Fornasin and C. Seghieri, 'Height, socioeconomic status and marriage in Italy around 1900', *Economics & Human Biology* 11 (2013) 465-473; S. Öberg, *Social bodies. Family and community level influences on height and weight, Southern Sweden 1818-1968* (Doctoral dissertation, Gothenburg 2014).

69 S. Carson, 'Geography, insolation, and vitamin D in nineteenth century US African-American and white statures', *Explorations in Economic History* 46 (2009) 149-159.

Table 2. OLS regression model on height (cm), Bruges and Ghent prisons, 1830-1870

	M1	M2	M3	M4
Social agrosystem				
Coastal Flanders	Ref.	Ref.	Ref.	Ref.
Inland Flanders	0.877***	0.865***	0.832***	0.344
Occupation				
Elite		-0.132	-0.132	-0.608
Lower middle class		Ref.	Ref.	Ref.
Farmers		0.799	0.814	0.751
Skilled workers		-0.346	-0.490	-0.457
Unskilled workers		-0.504	-0.530	-0.500
No information on HISCLASS		-1.492	-1.354	-1.154
Birth period				
1830-1834			-1.116*	-1.580**
1835-1839			-0.296	-0.671
1840-1844			-0.897	-1.405**
1845-1849			-0.208	-0.658
1850-1854			0.563	0.058
1855-1859			1.081	0.379
1860-1864			0.881	0.149
1865-1869			0.376	-0.061
1870			Ref.	Ref.
Prison				
Bruges prison				Ref.
Ghent prison				1.220***
Constant	165.810***	166.228***	166.185***	165.744***
Observations	3,339	3,334	3,326	3,326
R-squared	0.003	0.005	0.020	0.029

Source: Dataset of prisoners from Bruges and Ghent, see Figure 2. Time periods are calculated birth cohorts. Significance levels: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Still, it is somewhat surprising that the height difference between the two agrosystems is almost completely eliminated (<0.4 cm) when controlling for the prison. At the same time, the positive height effect of Ghent prison is strong (1.22 cm) and highly significant. This is remarkable since the measurements of convicts in 1858 and 1878 in Ghent prison were already corrected for measurements with shoes on by deducting 1.5 cm from the reported heights, as explained in the data section.

Life at the bottom of society

In the previous section, the height trend of prisoners born between 1830 and 1870 is summarised based upon regional variations (see Figure 5). In inland Flanders, we observe a more or less constant increase in average height from 166 cm in 1830 to 168 cm in 1870. The average stature in coastal Flanders evolves differently, increasing from about 166 cm to 167 cm. However, the height trend fluctuates more, with a downturn in the second half of the 1830s and a peak around 1850. The most intuitive explanation for the downturn in average height in the late 1830s and early 1840s is the economic crises of that time. According to Vandenbroeke, the hungry forties had the strongest impact on the social agrosystem of inland Flanders, more precisely in the linen districts.⁷⁰ The combination of diminishing employment in the rural textile sector and agricultural misfortune put this agricultural system under severe pressure. Still, the economic downturn in inland Flanders is not shown in the anthropometric evidence collected in the prisons of Bruges and Ghent. In fact, only in coastal Flanders does the height evolution reflect the crisis years. Boys born in villages in the Flemish polders during the late 1830s grew up to be significantly smaller adults. Given that malnutrition during adolescence can be very harmful to adult stature, especially when the possibilities of catch-up growth are limited, the timing of the downturn in height is not surprising.⁷¹ The stunting of boys growing up in the polders during the 1840s and 1850s suggests that the crises had a strong impact on individuals at the bottom of society in coastal Flanders. Society in this commercial business economy was highly polarised.⁷² Since the large farms were strongly market-oriented and a substantial share of the

70 C. Vandenbroeke, 'De proto-industriële en de industriële ontwikkeling van België in het kader van de internationale historiografie', *Revue belge de philologie et d'histoire* 63 (1985) 310-323, 319.

71 R. Akresh, S. Bhalotta, M. Leone and U. Osili, 'War and stature: growing up during the Nigerian civil war', *American Economic Review* 102 (2012) 273-277.

72 De Langhe, *Oude vrijsters*, 32.

population of the region were impoverished landless peasants, the dramatic increase in food prices during the crisis years must have deprived many of these peasants of the food required for an adequate diet, both in terms of quantity and quality. Apparently, the children of coastal Flanders never fully recovered from this nutritional deprivation and were stunted for life.

A closer look at the occupations of the prisoners helps in understanding the height differences between coastal and inland Flanders. While HISCLASS is a very useful approach for gauging historical occupational titles, most prisoners were in fact unskilled workers. Within this large group, the prime occupational categories were day labourers, agricultural workers and textile workers.⁷³ Not surprisingly, there were almost no textile workers from coastal Flanders since the rural linen industry was a characteristic of the economy of inland Flanders. Furthermore, it is also important to note that the prisoners' own occupations are used in Figure 6. As Lantzch and Schuster have shown, the convicts' own occupational titles can be used as a proxy when parental occupations are not available.⁷⁴

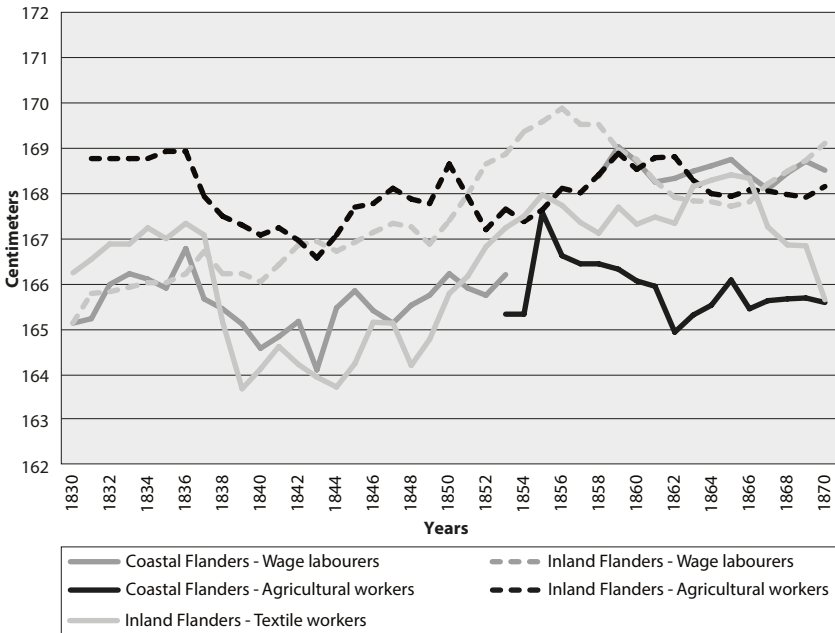
There are clear differences between the main occupational groups. Like the farmers, the agricultural workers of inland Flanders were rather tall. Since most agricultural households in this social agrosystem could keep full ownership of at least a small part of the farmstead, they could produce food to supplement their diet and were probably less vulnerable to increases in food prices. Unfortunately, there are not enough agricultural workers from coastal Flanders present in our sample to trace the height trend of this particular group during the 1840s. The reason for the small number of farmers and agricultural workers from coastal Flanders is twofold. First, farmers in general were heavily underrepresented in the sample.⁷⁵ Secondly, the occupational title of farmer was probably more applicable to the owners of large farmsteads, who were often relatively rich individuals. These wealthy farmers were less likely to be involved in criminal activities and consequently

73 The group of wage labourers consists of prisoners with the occupational title of day labourer, workman, factory worker, longshoreman, unskilled worker and very similar occupations. The group of agricultural workers consists of prisoners with the occupational title of agricultural worker and agricultural helper. The group of textile labourers consists of prisoners with the occupational title of weaver, cloth maker, flax dresser, upholsterer, spinner and similar occupations related to textile work. They all belong to HISCLASS 5 (unskilled workers), apart from the weavers, cloth makers, spinners and upholsterer, who are classified in HISCLASS 4 (skilled workers).

74 Lantzch and Schuster, 'Socioeconomic status and physical stature', 53.

75 In the dataset 13.1 per cent of the prisoners had an occupation in the agricultural sector. According to the census of 1856, 32.2 per cent of the men in West Flanders and 37.4 per cent of the men in East Flanders were active in this sector: data obtained from LOKSTAT, Ghent University Quetelet Center (www.lokstat.ugent.be).

Figure 6. Height trend for the main occupational groups (prison sample) in coastal and inland Flanders (cm), 7-year moving average, 1830-1870



Source: Dataset of prisoners from Bruges and Ghent, see Figure 2. Time periods are calculated birth cohorts.

do not show up in a sample derived from prison registers. Most agricultural workers in coastal Flanders would probably have called themselves day labourers and are therefore classified as wage labourers.

In terms of height, the wage labourers in coastal Flanders were at the bottom of society. In particular, the boys growing up during the difficult 1840s and 1850s were quite short. Since they constitute by far the largest group of prisoners (39 per cent), this is clearly reflected in the overall height trend of coastal Flanders (see Figure 5). Interestingly, their height trend is comparable with the trend of the textile workers in inland Flanders, an occupational group that also came under severe pressure during these decades. During the crisis years, the textile workers of inland Flanders were the shortest occupational group to be found in the Flemish prisons, indicating that the rural linen industry had suffered a severe blow. This is in line with the image of 'poor Flanders' struggling with a proto-industry facing severe problems.⁷⁶ However, there were far fewer textile workers

⁷⁶ Vandenbroeke, *le cas flamand*, 917; Vandenbroeke, 'De proto-industriële en de industriële ontwikkeling', 321.

present in the prison sample (8.8 per cent) and they barely affected the overall height trend of inland Flanders. There are some explanations for this observation. The heartland of the rural linen industry was located relatively far from the prisons of Ghent and Bruges and, although included in this study, it was mainly outside the judicial authority of the courts of the two cities. It may also be that the owners of the family-oriented small-holdings in inland Flanders were less likely to get involved in criminal activities because of the stronger support of the family network.⁷⁷ After 1850, the occupational height differences between wage labourers, textile workers and agricultural workers decreased. This has also been shown for eastern Belgium in previous research.⁷⁸ The magnitude of the socio-economic differences in height varied over time but became smaller during the nineteenth century.⁷⁹

Conclusions

The evolution of the average stature of convicts in the prisons of Ghent and Bruges indicates that the average height in the Flemish countryside increased slightly between 1830 and 1870 from about 166 cm to 168 cm. As such, height as a measure of the biological standard of living suggests progress in the quality of life in the Flemish countryside, particularly for children born after 1850. However, the analysis also shows a much more nuanced picture, with variations across space and time.

With regard to regional variations, prisoners born in coastal Flanders, which had a rural production system that was strongly market-oriented, were on average about 1 cm shorter than prisoners born in inland Flanders, thereby showing that the Komlos hypothesis also applies for a small region such as Flanders. Market-oriented food production and social polarisation were probably the main drivers of the height difference. This finding is also in line with the results observed by Tassenaar for certain Dutch areas. The evolution of prisoners' heights differed as well. The average height of prisoners from inland Flanders increased steadily for children born between 1830 and 1870, showing no strong negative effect due to the crises of the 1840s and 1850s. In contrast, the crises were very apparent in the height trend of prisoners from coastal Flanders, thus challenging the traditional

77 De Langhe, 'To thrive, one must be wive?', 209.

78 Alter, Neven and Oris, *Stature in transition*, 242.

79 Öberg, *Social bodies*, 6.

idea that the linen districts were hit particularly hard. Yet, to understand regional variations in rural Flanders, it is important to note that inland Flanders incorporates a territory that was larger than the heartland of the rural linen industry, making it possible that the negative effects in these villages were levelled out by developments in the rest of inland Flanders. I tried to mitigate this by looking specifically at the heights of several occupational groups. Two groups appeared particularly afflicted by the crises: the wage labourers of coastal Flanders and the textile workers of inland Flanders. As the prison records comprised a proportionally higher number of wage labourers, this resulted in a smaller stature in coastal Flanders. A similar composition effect, albeit of a more geographical nature, influences the trend of overall stature in inland Flanders. Still, the textile workers born in inland Flanders during the crises were the shortest group among the Flemish prisoners, suggesting that during childhood their families were indeed the ones most affected by the crises. When looking specifically at agricultural workers, the smaller stature of prisoners born in coastal Flanders is confirmed once more.

In sum, this study clearly shows that the biological standard of living provides a valuable approach for studying regional variations, as heights provide a key to discovering specific socio-economic differences that can explain such variations. The anthropometric evidence shows that the wage labourers in coastal Flanders and the textile workers in inland Flanders were the shortest occupational groups, especially before 1850. This is not a new story in itself, but highlights that the image of 'poor Flanders' was not unique to the densely populated linen districts, but related to specific occupational groups, reflecting the specificity of the economic environment around them. Still, this study is limited in two ways. First, by only examining male heights, half of the members of society were excluded. Comparable data on female stature in rural Flanders can be derived from the Belgian prison records, but this would require extensive data gathering since only about 14 per cent of nineteenth-century prisoners were women, and they were not registered separately from men. Secondly, more data on individuals born in the rural linen districts would have been preferable, since they played a prominent role in Flanders' economic history. Unfortunately, the prison registers for these particular areas were not preserved.

About the author

Ewout Depauw (1990) studied history at Ghent University and European Union Studies (Political Sciences) at the same university and at the Institut d'Etudes Européennes in Brussels. He is currently working on a PhD at Ghent University. He is interested in quantitative research methods and long-run evolutions. In his PhD-project he investigates the well-being of the lower classes by examining the heights of prisoners during the last quarter of the eighteenth century and the nineteenth century.

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