

## TABLE OF CONTENTS

<i>Philipp Robinson Rössner</i>	
Ian Blanchard. An Appreciation (incl. full list of publications).....	ix
 <i>Michael Palairat (Edinburgh)</i>	
The Descent into a Dark Age: Byzantine Europe, c.400–800 A.D.....	1
 <i>Richard Britnell (Durham)</i>	
Royal Initiative and Scottish Burghs, 1100–1400.....	25
 <i>Katalin Szende (Central European University, Budapest)</i>	
Neighbourhoods, Suburbs and Ethnic Quarters in the Hungarian Towns, Thirteenth to Fifteenth Centuries.....	43
 <i>Balázs Nagy (Central European University, Budapest)</i>	
The Study of Medieval Foreign Trade of Hungary: A Historiographical Overview.....	65
 <i>Phillipp Schofield (Aberystwyth)</i>	
Credit and its Record in the Later Medieval English Countryside.....	77
 <i>Philipp Robinson Rössner (Leipzig)</i>	
Bad Money, Evil Coins? Coin Debasement and Devaluation as Instruments of Monetary Policy on the Eve of the ‘Price Revolution’.....	89
 <i>John Munro (Toronto)</i>	
Necessities and Luxuries in Early-Modern Textile Consumption: Real Values of Worsted Saws and Fine Woollens in the Sixteenth-Century Low Countries.....	121
 <i>Thomas Max Safley (Pennsylvania)</i>	
The Höchstetter Bankruptcy of 1529 and its Relationship to the European Quicksilver Market.....	149
 <i>Nuala Zahedieh (Edinburgh)</i>	
Technique or Demand? The Revival of the English Copper Industry, ca. 1680–1730.....	167

## **Necessities and Luxuries in Early-Modern Textile Consumption: Real Values of Worsted Says and Fine Woollens in the Sixteenth- Century Low Countries \***

*John Munro (University of Toronto)*

If clothing has always been regarded as one of mankind's basic necessities, in providing protection against the elements, while also satisfying most societies' requirements for modesty and decorum (in banning nudity), clothing has also provided the upper classes with an important object of luxury consumption. As is clearly shown in so much sumptuary legislation in later medieval and early modern Europe, the wearing of very costly apparel – certainly luxuries in terms of the consumption patterns of the lower classes – served very important social objectives, especially for the aristocracy, the upper clergy and even the wealthy bourgeoisie: for the assertion of one's rank and social status and one's own personal values. While the assertion of such values may be deemed 'necessities' for the upper classes – to differentiate them clearly from the lower classes – such luxury apparel was generally also a matter of style and fashion. Indeed the role of fashion itself in the economies of medieval and modern societies is still a subject that is not yet fully understood. One may indeed conclude that the dividing line between 'necessities' and 'luxuries' is a difficult one to make, both in medieval and modern societies (European and North American).

During the medieval era, from the twelfth to fifteenth centuries in particular, the most prominent and certainly the most famous European region for the production of luxury woollen cloth was the Low Countries (Flanders, Brabant, and Holland). Less well known is the fact that in the twelfth, thirteenth, and very early fourteenth centuries this region had been equally prominent for the production of an even wider range of much cheaper and lighter textiles, the majority of which were exported to the Mediterranean basin.<sup>1</sup> The most prominent

\* Some aspects of this essay and the two tables were previously published in the far longer essay: John Munro, *Three Centuries of Luxury Textile Consumption in the Low Countries and England, 1330–1570: Trends and Comparisons of Real Values of Woollen Broadcloths (Then and Now)*, in: Kathrine Vestergård Pedersen / Marie-Louise B. Nosch (eds.), *The Medieval Broadcloth: Changing Trends in Fashions, Manufacturing and Consumption*, Ancient Textile Series, Vol. 6, Oxford 2009, pp. 1–73.

1 See John Munro, *Industrial Transformations in the North-West European Textile Trades, c. 1290–c. 1340: Economic Progress or Economic Crisis?*, in: Bruce M. S. Campbell (ed.), *Before the Black Death: Studies in the 'Crisis' of the Early Fourteenth Century*, Manchester / New York 1991, pp. 110–48; John Munro, *The "Industrial Crisis" of the English Textile*

were worsted-type *says* produced by *sayetteries* throughout England, the Low Countries and northern France (with very similar industries in Italy).

As I have contended in other recent publications, the international trade in textiles underwent very disruptive and deleterious structural changes in later-medieval Europe: principally from the spreading stain of warfare – international, regional, and local of civil wars – beginning in the 1290s, and continuing directly into the Hundred Years' War (1337–1453). In essence, warfare and its political consequences, combined with a dramatic fall in population after the Black Death, raised the transaction costs of long-distance trade – in terms of transportation, protection, and marketing costs – while also raising the taxation of trade, to often prohibitive levels. Indeed, those rising transaction costs virtually eliminated the long-distance commerce in the cheaper textiles from north-west Europe to the far distant Mediterranean basin, all the more so since transaction costs are a function of scale economies, now much reduced by demographic decline. That was all the more true for those who produced cheap textiles that lacked any distinguishing features, and were indeed undistinguishable from almost identical products produced in the Mediterranean basin itself. Necessarily acting as 'price takers', these northern producers thus were unable to raise prices to compensate for rising transaction costs.

Producers of luxury woollens, on the other hand, had always striven to differentiate their products by distinguishing superior quality over those of their competitors. Thus acting as 'price-makers', in the context of 'monopolistic competition', they were better able to raise their prices (for a much smaller, wealthier market); and in any event, rising transaction costs were a far smaller proportion of final retail prices. Consequently, the late-medieval Low Countries experienced a major reorientation in textile production and trade away from the *sayetteries* to an overwhelming concentration on heavy-weight luxury woollens, whose chief markets came to be those in the Baltic and northern Europe. Since the single most important component of luxury woollen was fine English wool, the Low Countries' draperies had no choice but to accept, from the 1330s, increasingly extortionate taxation of English wool exports.<sup>2</sup>

Towns, 1290–1330, Thirteenth-Century England: VII, ed. Michael Prestwich, Richard Britnell, and Robin Frame, Woodbridge, UK 1999, pp. 103–41; Patrick Chorley, The Cloth Exports of Flanders and Northern France During the Thirteenth Century: A Luxury Trade?, *Economic History Review*, Second Series, 40/3, (1987), pp. 349–79; Patrick Chorley, English Cloth Exports During the Thirteenth and Early Fourteenth Centuries: The Continental Evidence, *Historical Research: The Bulletin of the Institute of Historical Research*, 61:144 (1988), pp. 1–10; Wendy Childs, The English Export Trade in Cloth in the Fourteenth Century, in: Richard Britnell / John Hatcher (eds.), *Progress and Problems in Medieval England: Essays in Honour of Edward Miller*, Cambridge / New York 1996, pp. 121–47.

- 2 See the sources cited in n. 1, and also: John Munro, Patterns of Trade, Money, and Credit, in: James Tracy / Thomas Brady Jr. / Heiko A. Oberman (eds.), *Handbook of European History in the Later Middle Ages, Renaissance and Reformation, 1400–1600, Vol. I: Structures and Assertions*, Leiden 1994, pp. 147–95; John Munro, Anglo-Flemish Competition in the International Cloth Trade, 1340–1520, *Publication du centre européen d'études bourguignonnes*, 35 (1995), pp. 37–60 [Rencontres d'Oxford (septembre 1994): L'Angleterre

By the early sixteenth century, however, with both a major reduction in the incidence of warfare and with renewed demographic growth, especially with a dramatic growth in urban populations that led to superior scale economies in trade, and with major innovations in transportation and marketing, transaction costs fell dramatically. Those cost reductions consequently promoted the fortunes of those engaged in producing and marketing the cheaper, lighter textiles, especially to the Mediterranean basin, and also the Spanish Americas – warmer climate zones that provided better markets for lighter textiles. By the 1530s, the most prominent textile producers, by both volume and value, in the Low Countries were the *sayetteries* (with other *draperies légères*), again led by Hondschoote.<sup>3</sup>

Furthermore, even before the 1530s, this region's luxury woollen cloth industries had largely succumbed, though never entirely, to the overwhelming competition from the much lower-cost and more cheaply-priced English woollen broadcloths (woven from tax-free wools) in most European textile markets. Such once renowned and very prominent luxury woollen draperies, as represented here, from both Ghent (Flanders) and Mechelen (Brabant), had managed to survive into the sixteenth century, though almost as shadows of their former selves, by serving a very narrow market niche of the ultra-rich in European society.<sup>4</sup> Nevertheless, the prices of their woollens were, in the 1530s, relatively no higher (in 'real

et les pays bas bourguignonnes: relations et comparaisons, XVe–XVIe siècle, ed. Jean-Marie Cauchies]; John Munro, The Origins of the English 'New Draperies': The Resurrection of an Old Flemish Industry, 1270–1570, in: Negley B. Harte (ed.), The New Draperies in the Low Countries and England, 1300–1800, Pasold Studies in Textile History no. 10, Oxford / New York 1997, pp. 35–127; John Munro, The Symbiosis of Towns and Textiles: Urban Institutions and the Changing Fortunes of Cloth Manufacturing in the Low Countries and England, 1270–1570, in: The Journal of Early Modern History: Contacts, Comparisons, Contrasts, 3:1 (1999), pp. 1–74; John Munro, The Low Countries' Export Trade in Textiles with the Mediterranean Basin, 1200–1600: A Cost-Benefit Analysis of Comparative Advantages in Overland and Maritime Trade Routes, The International Journal of Maritime History, 11:2 (1999), pp. 1–30; John Munro, The "New Institutional Economics" and the Changing Fortunes of Fairs in Medieval and Early Modern Europe: The Textile Trades, Warfare, and Transaction Costs, Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte, 88:1 (2001), pp. 1–47; John Munro, Medieval Woollens: The Western European Woollen Industries and their Struggles for International Markets, c.1000–1500, in: David Jenkins (ed.), The Cambridge History of Western Textiles, 2 vols., Cambridge / New York 2003, Vol. I, chapter 5, pp. 228–324, 378–86 (bibliography).

3 See sources cited in n. 2 above; and also: Emile Coornaert, La draperie-sayetterie d'Hondschoote, XIVE–XVIIIe siècles, Paris 1930; Emile Coornaert, Une industrie urbaine du XIVE au XVIIe siècle: l'industrie de la laine à Bergues-Saint-Winoc, Paris 1930; Emile Coornaert, Draperies rurales, draperies urbaines: l'évolution de l'industrie flamande au moyenâge et au XVI siècle, Belgische tijdschrift voor filologie en gescheidenis/Revue belge de philologie et d'histoire, 28 (1950), pp. 60–96; Jan Craeybeckx, L'industrie de la laine dans les anciens Pays-Bas méridionaux de la fin du XVIe au début du XVIIIe siècle, in Marco Spallanzani (ed.), Produzione, commercio e consumo dei panni di lana, Florence 1976, pp. 21–43.

4 See the sources cited above in n. 2.

terms’) than they had been in the mid-fifteenth century.<sup>5</sup> Furthermore, as Table 1 demonstrates, the 1546 drapery ordinance for the Ghent *dickedinnen* indicates that it was exactly the same woollen broadcloth whose production had previously been regulated in 1456; and indeed this ‘medieval broadcloth’ seems to have been manufactured without any significant changes from at least the mid-fourteenth century.<sup>6</sup> The other sixteenth-century broadcloth in Table 2, the Mechelen *Rooslaken*, also seems to have been unaltered since its first appearance in the mid-fifteenth century.

If we may regard the other wool-based textiles in Table 2, the light-weight and relatively cheap worsted-type Hondschoote *says*, as textile products that represent a ‘necessity’ in terms of meeting fundamental needs for clothing, and if we may regard the long predominant Ghent *dickedinnen* broadcloths and the newer Mechelen *Rooslakenen* as representative luxury-quality woollens for the early sixteenth century, then we are fortunate in having a price list that permits a comparison of not just their relative prices, but also their ‘real’ values in terms of other commodities and the purchasing power of industrial labour. The relevant price and value data for these textiles will be found in Table 2, for the decade from the mid-1530s to the mid-1540s.

To be sure, ‘homespun’ or cottage-produced textiles might better meet the test of representing ‘necessities’; and conversely, woollen scarlets and silk fabrics would be better representations for luxury – or ultra-luxury – consumption. But for none of these do we have comparative market prices. In the first place, homespun textiles by their very nature were not traded in markets. Second, scarlets had largely disappeared from northern markets by the mid-fifteenth

5 See also n. 29 below, and the conclusion to this study. For the evidence on relative prices, from a wide variety of late-medieval draperies, see John Munro, *The Anti-Red Shift – to the Dark Side: Colour Changes in Flemish Luxury Woollens, 1300–1550*, *Medieval Clothing and Textiles*, 3 (2007), pp. 55–95, and especially Tables 4.1 (pp. 58–61), Table 4.3 (pp. 68–72); Table 4.4 (p. 74). Table 4.5 (pp. 82–83); John Munro, *The Medieval Scarlet and the Economics of Sartorial Splendour*, in: Negley B. Harte / Kenneth G. Ponting (eds.), *Cloth and Clothing in Medieval Europe: Essays in Memory of Professor E. M. Carus-Wilson*, *Pasold Studies in Textile History No. 2* London 1983, pp. 13–70; esp. Table 3.6, p. 42; Table 3.7, p. 43; Table 3.8, p. 44; Table 3.11, pp. 49–50; Table 2.14, pp. 67–68; John Munro, *Industrial Protectionism in Medieval Flanders: Urban or National?*, in: Harry Miskimin / David Herlihy / A. L. Udovitch (eds.), *The Medieval City*, New Haven / London 1977, pp. 229–67, Table 13.32, pp. 257–62; Table 13.5, pp. 266–67; Munro, *Resurrection of an Old Flemish Industry*, Tables 1–2, pp. 39–44. For the forms, nature, and technology of medieval northern broadcloths, see John Munro, *Medieval Woollens: Textiles, Textile Technology, and Industrial Organisation, c. 800–1500*, in: David Jenkins (ed.), *The Cambridge History of Western Textiles*, 2 vols., Cambridge / New York 2003, Vol. I, chapter 4, pp. 181–227, and footnote sections below.

6 The Flemish textile term *dickedinnen* literally means ‘thick and thin’. It probably refers to the twilled weave with an alternation of two wefts and then one weft over the warp yarns, giving a slightly ribbed effect. See Guy De Poerck, *La draperie médiévale en Flandre et en Artois: Technique et terminologie*, 3 vols., Bruges 1951, Vol. III: *Glossaire flamand*, p. 29, no. 118. Such woollens were also manufactured at Bruges, Ypres, and Mechelen.

century.<sup>7</sup> Third, while silks had become even more prominent in European luxury textile markets, by the sixteenth century, we certainly do not have the data to compare prices with product sizes for the very wide variety of silken textiles (satins, damasks, velour, etc.), in various and widely differing dimensions.<sup>8</sup> We do, however, have such data for both luxury woollen broadcloths and Hondschoote *says*, as presented in both Tables 1 and 2.

#### THE PHYSICAL COMPOSITION OF WOOLLENS AND WORSTEDS AND THE TECHNOLOGY OF THEIR PRODUCTION

But before examining these differences in prices and relative values, we must first examine the physical differences between wool-based textiles grouped into three categories: worsteds (or says), woollens, and a hybrid category, commonly called serges.<sup>9</sup> Worsteds, a very ancient textile fabric, historically preceding genuine woollens, were generally the much lower-quality, lighter, and least expensive of the three types. They were woven from relatively cheap, coarse, strong, long-stapled 'dry' yarns (20.0 to 30.5 cm), worsted yarns in both warps and wefts; and they were generally woven on a narrow, one-man horizontal treadle-loom, often with a diamond or lozenge twilled weave.

Woollens, on the other hand, were generally the much finer-quality, much heavier, and more expensive of these three types. The principal reason for their

7 See Munro, *The Anti-Red Shift*, pp. 73–77, 84–91 (esp. n. 49).

8 For the late-medieval silk industry, see John Munro, *Silk*, in: Joseph R. Strayer et al. (eds.), *Dictionary of the Middle Ages*, 13 vols., New York 1982–88, Vol. 11: *Scandinavian Languages to Textiles, Islamic*, New York 1988, pp. 293–96; Giovanni Federico, *Silk Industry*, in: Joel Mokyr (ed.), *The Oxford Encyclopedia of Economic History*, 5 vols., Oxford / New York 2003, vol. 4, pp. 483–91; Luca Mola, *La seta in Italia dal Medioevo al Seicento: dal baco al drappo*, Marsilio 2000; Luca Mola, *The Silk Industry of Renaissance Venice*, Johns Hopkins University Press 2000; Paola Lanaro (ed.), *At the Centre of the Old World: Trade and Manufacturing in Venice and the Venetian Mainland, 1400–1800*, Publications of the Centre for Reformation and Renaissance Studies: Essays and Studies no. 9 (CRRSS: Victoria University in the University of Toronto 2006); Simonetta Caviacocchi (ed.), *La seta in Europa sec. XIII–XX: atti della 'Ventiquattresima Settimana di studi'*, 4–9 maggio 1992, Istituto internazionale di storia economica F. Datini, Le Monnier 1993. For prices of some silk fabrics in fifteenth-century England, see Munro, *Medieval Scarlet*, Table 3.15, p. 69.

9 For the following, see John Munro, *Textile Technology*, in: Joseph R. Strayer et al (eds.), *Dictionary of the Middle Ages*, 13 vols., New York 1982–88, Vol. 11: *Scandinavian Languages to Textiles, Islamic*, New York 1988, pp. 693–711; reprinted in: John Munro, *Textiles, Towns, and Trade: Essays in the Economic History of Late-Medieval England and the Low Countries*, Variorum Collected Studies series CS 442, Aldershot, Hampshire / Brookfield, Vermont 1994; Munro, *Medieval Woollens: Textiles, Textile Technology, and Industrial Organisation*, pp. 181–227; Patrick Chorley, *The Evolution of the Woollen, 1300–1700*, in: Negley B. Harte (ed.), *The New Draperies in the Low Countries and England, 1300–1800*, *Pasold Studies in Textile History* no. 10, Oxford / New York 1997, pp. 7–34. For silks, see n. 8 above.

greater weight, better quality, and higher cost (when undyed) was their wool-composition: very fine, curly, short-stapled (5.0–6.0 cm) ‘greased’ or ‘wet’ yarns, in both warp and weft. In medieval Europe, by far the finest and thus the most costly wools of this type were, as noted earlier, English: specifically, in order of quality and value, those from the Welsh Marches or counties of Herefordshire and Shropshire; second, from the adjacent Cotswolds counties of Worcestershire, Gloucestershire, Oxfordshire, and Berkshire; and a more distant third, those from the Kesteven and Lindsey districts of Lincolnshire.<sup>10</sup>

#### THE TECHNIQUES AND PHYSICAL NATURES OF WOOL-BASED TEXTILE PRODUCTION

The necessary techniques to prepare these fine wools for weaving also explain the much heavier weights of these woollen textiles: i.e., combing (for the warp yarns), carding (for the weft yarns), spinning (drop-spindle for warps and spinning wheels for the wefts), warp-winding on the loom, and weft-insertions in the weaving bobbins; weaving itself (wefts inserted with shuttles through heddles for the warps); and then fulling the woven cloth, prior to the finishing processes of shearing and dyeing. A major distinction between these textiles was in oiling or greasing the short, curly, scaly-fibred wools for woollens: with butter, olive oil, or herring fat (though generally forbidden), in order to protect them from entanglement and thus damages in these ensuing processes. That was all the more necessary since the natural oils or lanolin in the wool fibres had been removed in the cleansing and scouring processes of wool preparation.

Worsted wools, on the other hand, did not require any such greasing. First, they were not scoured, and thus retained their own natural lanolin. Second, they were very strong and sufficiently straight-stapled that they did not need such protection in the combing, spinning, and weaving processes. For this basic reason, in the medieval and early-modern Low Countries and France, the woollen industries were known as the ‘greased’ (or wet) draperies: *draperies ointes*; or in Flemish (Nederlands), the *gesmoutte draperie (lakenindustrie)*. Conversely, the worsted industries were known as the ‘dry’ draperies: *draperies sèches* (and also: *draperies légères*) and, in Flemish, *droge draperie (lichte draperie)*.

10 See John Munro, Wool-Price Schedules and the Qualities of English Wools in the Later Middle Ages, ca. 1270–1499, *Textile History*, 9 (1978), pp. 118–69; and Id., The 1357 Wool-Price Schedule and the Decline of Yorkshire Wool Values, *Textile History*, 10 (1979), pp. 211–19; both reprinted in Munro, *Textiles, Towns, and Trade*. See also Munro, *Textile Technology*, pp. 693–711; Munro, *Medieval Woollens: Textiles, Textile Technology, and Industrial Organisation*, pp. 181–227.

## FULLING AND FINISHING WOOLLENS

The removal of that grease, and also the starchy warp-sizing, and dirt adhering to both, explains the first and very necessary reason for the fulling processes that ensued when the woven woollen was removed from the loom. That was a two-man treadle-operated broadloom, producing cloths that were up to 4.0 metres in width, and up to 33 metres in length (Table 1). These woollen cloths were then placed in a fuller's vat, or large earthenware tub, containing an emulsion of warm water, fuller's earth (hydrous aluminium silicates), and also urine, even though it was widely prohibited. The fullers, usually a pair of husky journeymen, supervised by a master, then vigorously trod upon the soaking cloth, for periods ranging from three to five days, according to the quality of the cloth and the season (since the working day in summer was twelve to fourteen hours, but only eight hours in the winter).<sup>11</sup> The ammonia in the urine not only enhanced the scouring and bleaching properties of fuller's earth, but also combined with the grease to form a cleansing soap.<sup>12</sup>

The equally or even more important reason for fulling woollens was two-fold. The first was to force the curly, scaly and weak fibres to interlace and interlock and thus to felt, in order to give the cloth cohesion and strength; for otherwise, an unfulled cloth taken from the loom would suffer tearing, possibly to the extent of falling apart. The second and related objective was to shrink and compress the cloth, by as much as one half.<sup>13</sup> Both objectives were achieved by the combination of foot-pounding (pressure), heat, water, and the action of the chemicals known as *fuller's earth*.<sup>14</sup> That compression (see Table 1) therefore also fundamentally

- 11 See sources in nn. 1–2, 9–10; and also John Munro, *Industrial Entrepreneurship in the Late-Medieval Low Countries: Urban Draperies, Fullers, and the Art of Survival*, in: Paul Klep / Eddy Van Cauwenberghe (eds.), *Entrepreneurship and the Transformation of the Economy (10th–20th Centuries)*. Essays in Honour of Herman Van der Wee, Leuven 1994, pp. 377–88.
- 12 These scouring agents also made the wools more receptive to the dye-fixing mordant, usually alum, when the cloth was subsequently dyed in the piece. See my publications cited in nn. 2, 9, above.
- 13 In 1458, the Bruges fullers' ordinance for *bellaert* woollens stipulated that the overall shrinkage from this compression and felting, which gave the cloth its required strength and durability, had to be at least 56 percent (from 172 to 75 square ells): in length, from 43 to 30 ells (30m to 21m); and in width, from 4.0 to 2.5 ells (2.8m to 1.75m). See Octave Delepierre and M. F. Willems (eds.), *Collection des keuren ou statuts de tous les métiers de Bruges*, Ghent 1842. The better known Ghent *dickedinnen*-broadcloths of the fifteenth and sixteenth centuries (1456, 1462, 1546) underwent a very similar shrinkage, of 54 percent (from 75.49m<sup>2</sup> to 34.91m<sup>2</sup>). Marc Boone, *Nieuwe teksten over de Gentse draperie: wolaanvoer, productiewijze en controlepraktijken (ca. 1456–1468)*, *Bulletin de la commission royale d'histoire [de Belgique]*, 154 (1988), pp. 1–61; M. J. Lameere / H. Simont et al (eds.) *Recueil des ordonnances des Pays Bas, deuxième série: 1506–1700*, V, Brussels 1910, pp. 272–83. In both, and indeed in all such woollens, the width underwent greater shrinkage than the length (37.5 vs. 30.2 percent), because the warps were more tightly spun than the wefts.
- 14 Fuller's earth, a clay-like substance, is more properly known as *floridin*, whose chief hydrous aluminium silicate was usually kaolinite (Al<sub>2</sub>O<sub>3</sub>Si<sub>2</sub>O<sub>4</sub>·2H<sub>2</sub>O). See the sources cited in nn. 2 and 9 above.



explains why fulled woollen broadcloths were so much heavier than were worsteds (and also hybrid fabrics). Once fulled in this fashion, woollen broadcloths were virtually indestructible and could be worn by and through several generations, through inheritance or second-hand sales. At the same time, the fulling process obliterated almost all traces of the designs created by twilled weaving. That obliteration was completed by ensuing processes of cloth-tentering (to remove all wrinkles and defects, restoring some of the lost area), teaselling or napping (using thistle-like teasels to raise the naps, or loose ends of fibres), and shearing – by a repeated process of napping and shearing – so that the final product was as soft and fine as silks.

Fulling was the one and only major process of woollen cloth manufacturing that underwent powered mechanization before the modern Industrial Revolution: in woollens, really only in the mid nineteenth century.<sup>15</sup> Water-powered fulling mills had been introduced into Italian cloth manufacturing by the tenth century CE, and had become widely diffused in English and Italian cloth making during the thirteenth and fourteenth centuries. That process, using cams and trip-hammers to convert the rotary power of the water wheel into reciprocal power, effected the fulling processes by pounding the cloth with a pair of heavy oak blocks (about 24 kg in weight), up to 40 times per minute. The economic significance of this industrial innovation can be seen in comparative production costs: traditional foot-fulling accounted for about twenty percent of the value-added pre-finishing costs (in the medieval Low Countries); but mechanical fulling (as documented in Florence), combined with tentering, accounted for only about five percent of such costs. Thus, with a potential of a 75 per cent savings in the fulling processes, one can readily understand why the English cloth industry had become almost completely converted to this form of mechanized fulling, by the later fourteenth or early fifteenth century.

While fulling mills can be found in the southern Low Countries in the thirteenth and early fourteenth centuries, they had largely disappeared with the radical reorientation of textile manufacturing to luxury woollen cloth production, certainly from the 1330s. The luxury-oriented draperies refused to consider using mechanical fulling mills, for fear that this pounding process would impair the luxury quality of their woollens. In any event, when one considers that the wools and dyestuffs accounted for the overwhelming proportion of manufacturing costs – often over 80 percent – the potential price-savings from mechanical fulling was very small, and not enough to compensate for the loss of the drapery's reputation and thus the loss of customers. Furthermore, any slight reduction in price would have made no significant difference when the Flemish and other Netherlander

15 For this and the following see my publications cited in nn. 1–2, and 9 above, especially Munro, *Textile Technology*, pp. 693–711; Munro, *Medieval Woollens: Textile Technology*, pp. 181–227; Munro, *Industrial Entrepreneurship in the Late-Medieval Low Countries*, pp. 377–88. See also Paolo Malanima, *The First European Textile Machine*, in: *Textile History*, 17 (1986), pp. 115–28; Eleanora M. Carus-Wilson, *An Industrial Revolution of the Thirteenth Century*, *Economic History Review*, First Series, 11 (1941), reprinted in her *Medieval Merchant Venturers: Collected Studies*, London 1954, pp. 183–211.

luxury woollens were selling for as much as three times the price of English woollen broadcloths (in the fifteenth century).<sup>16</sup> Thus, even though the use of fulling mills was revived in the southern Low Countries during the sixteenth century, though principally only for cheaper woollens, the Ghent drapery continued to produce their fine luxury *dickedinnen* broadcloths with traditional foot-fulling, as did the Mechelen drapery producing *Rooslakenen*.

### FINISHING WORSTEDS

In contrast, worsteds underwent no such fulling, napping, or shearing processes, but only bleaching and dyeing. The dyeing of both woollens and worsteds took place in the wools or yarns themselves, especially if woad (not requiring a mordant) had been used to produce a basic blue colour, and then in the piece, often using more woad and then madder (with a mordant, such as alum) to produce a wide variety of colours: deep blues, greens, browns, purples, blacks, etc. Those dyed red, or in red-related colours were normally dyed only in the piece. Thus, worsteds or worsted-type fabrics were generally so much cheaper than the true, heavy-weight fulled woollens for two reasons: first and foremost, because they contained far cheaper raw materials; and secondly, because their production processes were so much simpler, requiring considerably fewer stages of manufacturing, with considerably less labour.

### COMPARATIVE PRODUCTION COSTS OF WOOLLENS AND WORSTEDS: WOOLS AND LABOUR

If labour, on the other hand, accounted for a relatively higher proportion of total manufacturing costs in the worsteds industries, it constituted a correspondingly smaller share in the production of luxury woollens, especially those woven entirely from the very best English wools, whose high costs were further augmented by English export taxes, as noted earlier, reaching a peak burden in the early fifteenth century. Thus, for example, in the manufacture of a fine woollen black broadcloth at Leuven in 1434, the very fine English wools accounted for 76.2 percent of the pre-finishing manufacturing costs and for 62.5 percent of the total cost, while dyeing and dressing the cloth accounted for 18.0 percent of total costs – most of that in the woad and madder dyes themselves – so that the remaining share of manufacturing costs in labour amounted to only 19.5 per cent

16 For comparative woollen cloth prices, see sources in n. 5 above. A potential gain of 75 percent from mechanized fulling would have represented, in 1435, a savings of only 3.23 per cent of the sales price of a pair of Leiden's *voirwollen halvelakenen*, at £4 9s 0d *groot* Flemish; and a savings of only 2.73 per cent of that year's price of a Ghent *dickedinnen*, at £7 0s 0d *groot*. See Munro, *Industrial Entrepreneurship*, pp. 377–88, and my other publications cited in nn. 9, 11, 15.

of total costs.<sup>17</sup> Thus, labour's relatively higher share of total production costs in worsted manufacturing simply reflects the relatively lower costs in wools and other materials.

#### HYBRID WOOLLEN-WORSTED TEXTILES: FLEMISH SAYS AND SERGES, AND 'STUFFS' OF THE ENGLISH 'NEW DRAPERIES'

The third type of wool-based textile manufacturing was simply a hybrid of the other two main branches. Sometimes called says, serges or 'stuffs', these textiles were woven from a long-stapled 'dry' worsted warp and a short-stapled 'greased' woollen weft, though generally of much lower quality wools than those used in the true woollen broadcloth industry. In terms of relative weights and values, they corresponded more to worsted than to woollen manufacturing. For that reason, the hybrid or mixed-fabric *sayetteries* and similar serge-type cloth manufacturing industries were classed as part of the 'light draperies' or *draperies légères* (in Flemish: *lichte draperie*), in the medieval and early-modern Low Countries.

TABLE 1: THE DATA ON THE PHYSICAL COMPOSITION AND WEIGHTS OF WOOLLENS, WORSTEDS, AND SERGES (SAYS)

The nature of the physical differences, and thus differences in production costs and market prices, for the three types of wool-based textiles, in sixteenth-century England and the Low Countries, can now be better understood from the data given in Table 1. The sizes of the three luxury-quality woollens – from the draperies of Ghent (Flanders), Mechelen (Brabant), and Essex (England) – are roughly comparable in terms of the area, in square metres, of the finished cloths: 34.913 m<sup>2</sup>, for the Ghent five-sealed *dickedinnen* broadcloths; 35.604 m<sup>2</sup>, for the five-sealed *Gulden Aeren* (gold eagle) broadcloth woollens from Mechelen; and 37.095 m<sup>2</sup>, for English 'short' broadcloths from Essex. Note that all three of these woollen broadcloths were woven uniquely from the finest English wools (i.e., short-stapled), still the world's best wools.

Somewhat smaller in size, primarily because of its narrower width, with an area of 29.400 square metres, was the *Oultreffin* woollen manufactured by the

17 For another example: In the Ypres drapery, the fine Cotswold wool used in producing a black woollen broadcloth in 1500 accounted for 64.2 percent of pre-finishing manufacturing costs and for 52.0 per cent of total costs (and indeed the price for Cotswolds wool at Calais corresponds to the costs in the Ypres accounts for 1500, when one adds on transport and marketing costs). In the other manufacturing costs, the finishing process of dyeing and dressing again accounted for 19.2 per cent of total costs (17.7 percent in dyes and 1.5 percent in shearing costs); but this time somewhat more extensive and skilful labour in spinning, weaving, fulling, and tentering accounted for 26.2 per cent of total production costs. For the data sources, see Munro, *Industrial Protectionism in Medieval Flanders*, Table 13.2, p. 256; and Munro, *The Medieval Scarlet*, Table 3.12, p. 52.

relatively young Flemish *nouvelle draperie* of Armentières. Its distinguishing feature was its wool composition: two-thirds of which were Spanish *merino* wools and one-third English wools (Cotswolds, Lincolnshire Lindseys, and Berkshires). By the mid-sixteenth century, it must be noted, Spanish *merino* wools were rivalling the better English wools in quality, though they would not surpass the finest English wools until the seventeenth century.<sup>18</sup> The weight of the Armentières *oultreffin*, however, clearly indicates that this was a genuine fulled broadcloth: indeed it was the heaviest of all recorded in this table, with a weight of 820.503 grams per square metre of finished cloth. The next heaviest are the Essex broadcloths, with 782.58 grams per square metre; the Mechelen broadcloths are fairly close, at 746.42 grams per square metre (i.e., 97.7 percent of the latter), while the Ghent *dickedinnen*, for centuries that drapery's most renowned woollen, was only 677.66 grams per square metre (Bruges pound weight), or 633.77 grams (if the Ghent pound is used).

The lightest textile from the Low Countries was the narrow say from Bergues-St. Winoc, a pure worsted, in both warp and weft, which weighed only 260.352 grams per square metre, just 33.27 percent of the weight of an Essex broadcloth, and 34.06 per cent of the weight of Mechelen's *Gulden Aeren* broadcloth. But note, however, that the Hondschoote small double-say had a very similar weight: 266.334 grams per square metre. But even lighter was the Essex 'New Draperies' say (according to 1579 regulations): its weight of 141.193 grams per square metre was only 18.04 percent of the comparable weight of an Essex broadcloth; just over half (54.23 percent) of the weight of the aforementioned Bergues-St. Winoc say, and less than half the weight (42.49 percent of 332.307 grams per square metre) of the weight of an Essex single bay, another recent product of the English 'New Draperies'. The weight of that Essex single bay, on the other hand, was very close to that of the Hondschoote single say, which was (somewhat surprisingly) 340.052 grams per square metre (with a weight of 5.103 kg for the full-sized cloth of 15.006 square metres). It was heavier, per square metre of its area, than the small double Hondschoote say evidently because more wool was compressed into its much narrower width (0.613 metre compared to 1.138 metre for the double say). All three of these fabrics were hybrids, with 'dry', long-stapled worsted warps and 'greased' short-stapled woollen wefts. Indeed the Hondschoote *sayetterie* was probably the chief progenitor of the English New Draperies of later Tudor-Stuart England.<sup>19</sup>

18 The finest wools in the world today are those produced by sheep that are the descendants of the Spanish *merinos*, especially in Australia and New Zealand. See John Munro, Spanish Merino Wools and the Nouvelles Draperies: An Industrial Transformation in the Late-Medieval Low Countries, *Economic History Review*, Second Series, 58/3 (2005), pp. 431–84. See also my publications on wool in n. 10, above.

19 See Munro, *The Resurrection of an Old Flemish Industry*, pp. 35–127.

TABLE 2: COMPARATIVE PRICES AND VALUES OF LUXURY WOOLLENS AND SAYS IN ANTWERP IN THE 1530S, WITH VALUES IN TERMS OF A MASON'S DAILY WAGE

With this information on the physical compositions, sizes, and weights of these textiles, we may now better understand the data on textile prices presented in Table 2, for the decade 1535–1544. These years were chosen because they are the only ones for which I have found prices for Hondschoote *says*, as well as for the Ghent *dickedinnen* and Mechelen *Rooslaken* woollen broadcloths (but none, unfortunately, for the Armentières *Oultreffin* broadcloths). Indeed, for the Hondschoote *says*, the prices run, for consecutive years, from only 1538 to 1544. For that reason, the mean values are given only for these latter seven years: in arithmetic means for the textile prices themselves, for the daily wages of an Antwerp master mason (annual mean of summer and winter wages), and for the annual value of a 'basket of consumables'. The prices, wages, and values of the consumer baskets are given in the Flemish *groot* money-of-account, in which one pound (livre, pond) = 20 shillings (sous, sols, shillings) = 240 pence (deniers, penningen).<sup>20</sup>

Prices and wages by themselves are useful for the economic historian only if they can be related not only to each other but also to the values of other commodities. Such relationships are revealed in columns 7 to 19 (inclusive – i.e., the final twelve columns). Columns 7–10 indicate the number of days' wages that a master mason in Antwerp would have spent in purchasing one each of the following textiles: a Hondschoote single say, a Hondschoote double say, a Ghent *dickedinnen* broadcloth, and a Mechelen *rooslaken* broadcloth.

Thus, in summary, on average in the years 1538 to 1544, an Antwerp master mason would have had to spend 17.163 days' wages to purchase a Hondschoote single say (15.01 square metres); 39.382 days' wages (over twice as many) for a Hondschoote double say (27.869 square metres); but 265.954 days' wages to purchase a Ghent *dickedinnen* broadcloth (34.913 square metres); and somewhat less, 219.987 days' wages to purchase a Mechelen *Rooslaken* broadcloth (35.604 square metres).

Since, however, the dimensions of these four textiles varied from each other, and thus varied in the amount of men's clothing that were produced from them, we instead ask how many days' wages that master mason would spent to acquire 12 square metres of each, about the amount requisite to produce one suit of men's clothing (about three per broadcloth).<sup>21</sup> Those estimates, for each of these three

20 Although the wages and some of the prices were actually presented in the Brabant *groot* money-of-account, they were readily converted into Flemish money by dividing the Brabant wages and prices by 1.5 (the fixed ratio of the two currencies from 1435 to 1790). See n. 27 below.

21 The Mechelen *stadsrekeningen* accounts for cloth purchases (see Table 2) indicate that three men's suits were made from each *rooslaken* broadcloth, i.e., about ten Flemish ells (1 ell = 0.700 metre). According to Raymond Van Uytven, *Cloth in Medieval Literature of Western Europe*, in: N. B. Harte and K. G. Ponting (eds.), *Cloth and Clothing in Medieval Europe*:

textiles, are produced in columns nos. 11–14. For this period, the average number of days' wages required to purchase that same quantity of cloth (12 square metres) would have been: 13.725 days for a Hondschoote single say; 16.958 days for a Hondschoote double say; and 5.4 times as many days, 91.413 for a Ghent *dickedinnen*, and 74.144 days for a Mechelen *Rooslaken*.<sup>22</sup> To provide a modern comparison: in Toronto, in September 2011, a carpenter earns a minimum of \$35.39 per hour. At eight hours a day (vs. 12 hours in the sixteenth century), that carpenter would earn \$25,880.85 CAD (about € 19,908) in the 91.413 days of wage income that would have been required for the purchase of 12 sq. m. of the aforesaid Ghent *dickedinnen* in 1538–44. Few carpenters or other skilled tradesmen would ever spend even ten percent of that amount on clothing.

Certainly this comparison provides a very vivid contrast between the consumption of 'every day' textiles and luxury woollens. Consider again, from Table 2, that the number of days' wages that a master mason would have had to spend in acquiring a single Ghent *dickedinnen* varied from a high of 348.31 days' wages to a low of 240.00, in the ten year period from 1535 to 1544; and the mean for the years 1538 to 1554 was (again) 265.954 days' wages. Consider, furthermore, that the average number of days employment for master mason in the Antwerp region was about 210 days – so that this range went from 1.66 years to 1.14 years of employment.<sup>23</sup> In terms of perhaps the more useful comparative measure, the number of days' wages needed to purchase 12 square metres of woollen cloth, that number varied from a high of 119.718 days to a low of 79.055 days, with the aforesaid mean of 91.413 days (for 1538–44).

Essays in Memory of Professor E. M. Carus-Wilson, *Pasold Studies in Textile History 2*, London 1983, pp. 151–83 (see p. 151), a complete outfit – 'a surcoat, a coat, a hood and a pair of trousers' – required about 15 ells (10.50 metres).

- 22 The reasons for choosing the wages of an Antwerp master mason are three-fold. First building craftsmen were members of about the only occupation for which we possess a continuous series of time-rate (daily) wages for both the Low Countries and England, from the later medieval to modern eras, during which period most wage-earners earned piece-work wages (i.e. payment for the quantity of work produced); and for such craftsmen, masons' wages are the most prevalent and continuous. Second, this was an occupation that was basically unchanged in its technology and productivity over this period, and up to the nineteenth century, thus permitting reasonable comparisons of nominal and real wages over time. Third, the Antwerp market was one in which all these textiles were bought and sold in the sixteenth century.
- 23 For the estimate of 210 days annual employment, see Herman van der Wee, *Growth of the Antwerp Market and the European Economy (Fourteenth-Sixteenth Centuries)*, 3 vols. The Hague 19653), Vol. I: Statistics, Appendix II: Wages, pp. 457–60; and Appendix 48, pp. 540–44; John Munro, *Builders' Wages in Southern England and the Southern Low Countries, 1346–1500: A Comparative Study of Trends in and Levels of Real Incomes*, in: Simonetta Caviacocchi (ed.), *L'Edilizia prima della rivoluzione industriale*, secc. XIII–XVIII, *Atti delle "Settimana di Studi" e altri convegni*, no. 36, Istituto Internazionale di Storia Economica "Francesco Datini", Florence 2005, pp. 1013–76, esp. pp. 1028–31; John Munro, *Urban Wage Structures in Late-Medieval England and the Low Countries: Work-Time and Seasonal Wages*, in: Ian Blanchard (ed.), *Labour and Leisure in Historical Perspective, Thirteenth to Twentieth Centuries*, Stuttgart 1994, pp. 65–78.

It is difficult to believe that any comparable wage-earner in today's society would ever spend that much on luxury apparel – not even for a 'Sunday Best'. Thus, we may reasonably expect that the principal market for these *dickedinnen* were the aristocracy and very wealthy bourgeoisie – not master building craftsman (let alone their journeymen). The number of days' wages to purchase the Hondschoote says, whether single or double – a mean of 17.163 days for the single and a mean of 39.382 days for the double – is certainly much more in line with contemporary expenditure patterns on clothing, for the lower middle classes. Certainly, when we consider that the nature of a mason's trade, in terms of technology, labour, and capital, was virtually unchanged from the thirteenth to nineteenth centuries (see n. 22), this technique based upon the purchasing power of skilled industrial labour provides a very valuable means of estimating the 'real' values, and comparative values, of such textiles. But it is not the only means.<sup>24</sup>

#### PRICE INDEXES AND THE 'BASKET OF CONSUMABLES' IN MEASURING CLOTH VALUES

We now turn to a different measure of comparison of textile values, with perhaps limited use for this period, but of very great value in comparing the 'real' value of such textiles over several centuries: the value of a 'basket of consumables'. Column 15 provides the aggregate value of the various commodities, in Flemish pence *groot*, as contained in the Prof. Herman van der Wee's 'basket of consumables' for Brabant (Antwerp-Lier-Brussels region).<sup>25</sup> He constructed his

24 A note about the statistical technique of calculating the mean in Table 2. For columns 7–14, and 16–19, the harmonic mean was used: i.e., in measuring the quantity of the four textiles in terms of the purchasing power of a mason's daily wage, and then of the value of a Brabant 'basket of consumables' (see below). To quote one statistical authority on this issue: the harmonic mean is 'a calculated average computed by finding the reciprocal of the arithmetic mean of the reciprocals of the numbers to be averaged'; and 'in economic computation the harmonic mean is used in averaging such data as time rates and rate-per-dollar prices' – or here, rate per daily wage or value of the consumer basket. The harmonic mean is always slightly less (by varying amounts) than the corresponding arithmetic mean; but it is the only method that provides consistently valid results. The mathematical equation is:  $HM = 1 / [ \sum (1/r_1 + 1/r_2 + 1/r_3 + \dots + 1/r_n) ] / N$ , where  $r$  is the value and  $N$  is the number of years in the series averaged. It can also be used in index numbers for, say, real wages: the purchasing power of the nominal, money wage = Nominal Money Wage Index divided by the Consumer Price Index. If five-year means of real wages were calculated for the base period of this index – i.e., 1451–75 = 100, then the mean value as the average of the five 5-year periods in this base period would equal exactly 100.00 only if the harmonic mean is used. See Harold Sloan / Arnold Zurcher, *A Dictionary of Economics*, 3rd ed. New York 1953, pp. 149–50; and also F. C. Mills, *Introduction to Statistics*, New York 1956, pp. 108–12, 401.

25 Herman Van der Wee, *Prijzen en lonen als ontwikkelingsvariabelen: Een vergelijkend onderzoek tussen Engeland en de Zuidelijke Nederlanden, 1400–1700*, in: *Album aangeboden aan Charles Verlinden ter gelegenheid van zijn dertig jaar professoraat*, Gent 1975, pp. 413–47; reissued in English translation (but without the tables) as Van der Wee, *Prices and Wages as Development Variables: A Comparison Between England and the Southern Netherlands*,

‘consumer price index’ on the model of the famous Phelps Brown and Hopkins ‘basket of consumables’.<sup>26</sup> For the years following 1500, the Van der Wee Brabant price index has been used for Flemish textile values, on the grounds that by then the two economies, having undergone monetary unification in 1433–35, were sufficiently well integrated, within a relatively small geographic era, to permit its use for this purpose.<sup>27</sup>

The purpose of these commodity price-indexes must be fully understood. Money-of-account prices and wages – what are known as *nominal* prices and wages – are useless by themselves, because the value of coined money itself (here: the Flemish and Brabantine silver pence) changed so radically during the later-medieval and early modern eras, especially with often radical coinage debasements, and then, from 1515, with the general onset of the inflationary Price Revolution era.<sup>28</sup> For example, the mean price for a Ghent *dickedinnen* in the years 1538–44, in Table 2, was £13.657 *groot* Flemish; but a century earlier, in

1400–1700, *Acta Historiae Neerlandicae*, 10 (1978), pp. 58–78; and reprinted in Herman Van der Wee, *The Low Countries in the Early Modern World*, Aldershot 1993, pp. 223–41. The Van der Wee Brabant consumer price index (1400–1700) contains ten commodities: wheat (126.0 litres), barley-malt (162.0 litres), beef (23.5 kg), herring (40 in number), butter (4.8 kg), cheese (4.7 kg), charcoal (162.0 litres), candles (1.333 kg), linen cloth (1.800 metres), and low-grade coarse woollens (1.125 metres). Grains (rye and barley) account for 18.24 percent of the basket by value; drink (barley malt), for 17.08 percent; meat (beef), for 23.53 percent; fish (herring), for 4.30 percent; butter and cheese together, for 11.05 percent; fuel and light (charcoal and candles), for 7.82 percent; and textiles (linen and coarse woollens), for 18.00 percent.

- 26 E. Henry Phelps Brown / Sheila V. Hopkins, *Seven Centuries of the Prices of Consumables Compared with Builders’ Wage-Rates*, in: *Economica*, 23/92 (1956), pp. 296–314; reprinted in E. M. Carus-Wilson (ed.), *Essays in Economic History*, 3 vols., London 1954–62, vol. II, pp. 179–96, and also in E. H. Phelps Brown / Sheila V. Hopkins, *A Perspective of Wages and Prices*, London 1981, pp. 13–59, containing tables not presented in their earlier publications. The Phelps Brown & Hopkins index contains 16 commodities: wheat (45.461 l); rye (36.369 l); barley (18.184 l); peas (24.243 l); barley-malt (163.659 l); pigs (0.500); sheep (0.500); beef (14.696 kg); herrings (40 in number); butter (4.536 kg); cheese (4.536 kg); charcoal (154.567 l); candles (1.247 kg); lamp oil (0.284 l); linen (0.610 m); shirting (0.457 m); coarse woollens (0.304 m). Farinaceous products account for 20.00% of the basket; drink (malt), for 22.50%; meat, for 21.00%; fish, for 4.00%; fuels, for 7.50%; and textiles, for 12.50%.
- 27 See John H. Munro, *Wool, Cloth and Gold: The Struggle for Bullion in Anglo-Burgundian Trade, 1340–1478*, Brussels / Toronto 1973), pp. 100–103; Peter Spufford, *Monetary Problems and Policies in the Burgundian Netherlands, 1433–1496*, Leiden 1970, pp. 152–63; Van der Wee, *Growth of the Antwerp Market*, Vol. I, Tables XIII–XV, pp. 123–29.
- 28 See John Munro, *Bullion Flows and Monetary Contraction in Late-Medieval England and the Low Countries*, in: John F. Richards (ed.), *Precious Metals in the Later Medieval and Early Modern Worlds*, Durham, North Carolina 1983, pp. 97–158; John Munro, *Wage Stickiness, Monetary Changes, and Real Incomes in Late-Medieval England and the Low Countries, 1300–1500: Did Money Matter?*, *Research in Economic History*, 21 (2003), pp. 185–297; Munro, *Patterns of Trade, Money, and Credit*; John Munro, *The Monetary Origins of the “Price Revolution:” South German Silver Mining, Merchant-Banking, and Venetian Commerce, 1470–1540*, in: Dennis O. Flynn / Arturo Giráldez / Richard von Glahn (eds.), *Global Connections and Monetary History, 1470–1800*, Aldershot / Brookfield, Vt. 2003, pp. 1–34; Munro, *Price Revolution*.



1441–45, the mean price for the same *dickedinnen*, in the same currency, was ‘only’ £8.008 *groot* Flemish – i.e., in ‘nominal’, rather than in ‘real’ terms.<sup>29</sup>

When economists discuss, for example, economic problems involving both commodity prices and wages, they utilize the term ‘real wages’ in order to ‘discount’ or obviate the problems caused by such inflationary factors. The formula for calculating the ‘real wage’ in terms of index numbers is:  $RWI = NWI/CPI$ , i.e., the Real Wage Index is computed by dividing the Nominal (Money) Wage Index by the Consumer Price Index, when all three have a common base period – the years 1451–1475, in this study. The real wage therefore represents the purchasing power of the nominal or money wage (in coin), in terms of some defined basket of commodities, or in our modern era, goods and services.

In several recent publications, I have calculated real wages for building craftsmen in late-medieval England and the Low Countries: by both the traditional method, using index numbers, according to the formula just given; and also by an entirely new method. That new method is to compute the number of comparable baskets of consumables that masons (masters and journeymen) could have purchased with their annual money wage-income (in silver coin), for a standard work-year of 210 days.<sup>30</sup> In this study, I have utilized the same technique to provide better estimates of the ‘real’ values of these luxury woollens, with two related measures: (1) the values of these textiles in terms of the money-of-account values of Brabantine ‘baskets of consumables’ (with annual value in pence *groot* Flemish); (2) the method just used in the previous analysis: the quantity of these textiles that a master mason could have purchased with his money-wages, or rather the number of days’ wages that were necessary to acquire one of those textiles (or some fixed unit). These ‘baskets’ do not, however, represent any fixed requirement for annual consumption.<sup>31</sup>

The final four columns of Table 2, nos. 16 to 19, calculate the equivalent value of each of these four textiles in terms of the number of these Brabantine

29 See the sources for comparative textiles prices in n. 5, above.

30 See Munro, *Wage-Stickiness*, pp. 185–97; Munro, *Builders’ Wages*, pp. 1013–76; John Munro, *The Usury Doctrine and Urban Public Finances in Late-Medieval Flanders (1220–1550): Rentes (Annuities), Excise Taxes, and Income Transfers from the Poor to the Rich*, in: Simonetta Cavaciocchi (ed.), *La fiscalità nell’economia Europea, secc. XIII– XVIII / Fiscal Systems in the European Economy from the 13th to the 18th Centuries*, *Atti della ‘Trentanovesima Settimana di Studi’, 22–26 aprile 2007*, Fondazione Istituto Internazionale di Storia Economica ‘F. Datini’, Prato, Serie II: *Atti delle ‘Settimane de Studi’ et altri Convegni* 39 (Florence: Firenze University Press 2008), pp. 973–1026; John Munro, *Money, Wages, and Real Incomes in the Age of Erasmus: The Purchasing Power of Coins and of Building Craftsmen’s Wages in England and the Southern Low Countries, 1500–1540*, in: Alexander Dalzell / Charles G. Nauert, Jr. (eds.), *The Correspondence of Erasmus, Vol. 12: Letters 1658–1801, January 1526–March 1527*, Toronto 2003, Appendix, pp. 551–699.

31 Instead, according to Phelps Brown and Hopkins, their model basket represents ‘what a hundred pence [sterling] would buy in 1451–75’. This observation was a careless after-thought on their part. I have calculated that the actual mean value of their ‘basket of consumables’ for the base period 1451–75 was, instead, 112.08d sterling (9.340 shillings).

‘baskets of consumables’, i.e., the number of such consumer baskets whose aggregate value, in Flemish pounds *groot*, equals the value of just one of each of these textiles. For the period 1538 to 1544, the mean values of these four textiles, expressed as their value or worth in the numbers of the Brabant ‘baskets of consumables’ are, as follows: for Hondschoote single says, 0.689 basket; for Hondschoote double says, 1.580 baskets; for Ghent *dickedinnen* broadcloths, 10.685 baskets; and for Mechelen *rooslaken* broadcloths 8.804 baskets.

Obviously this measure of comparison, involving the values of baskets of consumables in relation to textile prices, does not differ in any significant terms from the alternative measure, i.e., the purchasing power of wages in terms of the quantity of these textiles. Both clearly and successfully demonstrate the very great, indeed enormous, gulf between the values of says, as ‘necessities’ in clothing, and luxury woollen broadcloths in the early sixteenth-century Low Countries.

Nevertheless, this statement about the comparability of these two measures for estimating the ‘real values’ of textiles is true only in the very short run, such as in this decade 1535–44. If we compare such textile values a century apart, we find, however, a lack of congruity, and thus a measure of statistical indeterminacy. Thus, the mean prices (five-years), in Flemish pounds *groot*, for absolutely identical Ghent *dickedinnen* broadcloths were earlier shown to be as follows: in 1441–45, £8.008; and in 1535–44, £13.657. Are the price differences purely the result of the intervening inflations over this century, or are there any ‘real’ differences? That depends on how measure chosen. For in 1441–45, the mean value of such a *dickedinnen* was 13.330 commodity baskets, but in 1535–44, it was significantly less – 10.685 baskets. However, if the measure is the purchasing power of wages, we find that in 1441–45, a master mason (Bruges) would have had to spend 174.258 days’ wages to purchase one such cloth; but, in 1535–44, an Antwerp mason would have had to spend much more – 265.954 days’ wages.<sup>32</sup> These differences represent the very sharp fall in ‘real’ industrial wages over this century (and perhaps regional differences as well), on the one hand, but also a relative decline in the value of Ghent *dickedinnen* woollens in relation to other consumer commodity prices by the 1540s, when the Price Revolution was well under way, with steeply rising food prices in particular.<sup>33</sup>

32 See sources in n. 5 above; and in my online Working Paper: ‘Luxury and Ultra-Luxury Consumption in Later Medieval and Early Modern European Dress (Tables 2–5):

[http://repec.economics.utoronto.ca/repec\\_show\\_paper.php?handle=tecipa-243](http://repec.economics.utoronto.ca/repec_show_paper.php?handle=tecipa-243).

33 See sources cited in n. 26 above.

**Table 1: The Dimensions and Compositions of Selected Woollens and Says in the 16th Century: England and the southern Low Countries**

<b>Drapery: City/Region</b>	<b>GHENT</b>	<b>MECHELEN</b>	<b>ESSEX</b>	<b>ARMENTIERES</b>	<b>BERGUES-ST.WINOC</b>
<b>Date of Ordinance</b>	<b>1456 and 1546</b>	<b>1544</b>	<b>1552</b>	<b>1510, 1546</b>	<b>1537</b>
<b>Name of Textile</b>	Dickedinnen	Gulden Aeren	Short Broadcloth	Oultreffin	Narrow Say
<b>Additional Names</b>	Five Seals	Five Seals	Suffolk, Essex		Fine
<b>Origin of Wools</b>	England	England: Herefords.	England	Spanish Merino (2/3)	Flanders, Artois
<b>Wool Types</b>	March, Cotswolds	'Lemster Ore'	short-stapled	English Cotswolds (1/3)	long-stapled
<b>Length on Loom: ells/yds</b>	42.500	48.000	n.s.	42.000	n.s.
<b>Length on Loom: metres</b>	29.750	33.072	n.s.	29.400	n.s.
<b>Width on Loom: ells</b>	3.625	4.000	n.s.	3.000	n.s.
<b>Width on Loom: metres</b>	2.538	2.756	n.s.	2.100	n.s.
<b>Weight on Loom: lb.</b>	88.000	n.s.	n.s.	88.000	n.s.
<b>Weight on Loom: kg.</b>	38.179	n.s.	n.s.	40.823	n.s.
<b>Final Length: ells/yds</b>	30.000	30.000	24.000	30.000	40.000
<b>Final Length: metres</b>	21.000	20.670	22.555	21.000	28.000
<b>Final Width: ells/yds</b>	2.375	2.500	1.750	2.000	1.000
<b>Final Width: metres</b>	1.663	1.723	1.645	1.400	0.700
<b>No. of Warps</b>	2066.000	3120.000	n.s.	1800.000	1400.000
<b>Warps per cm (fulled)</b>	12.427	18.113	n.s.	12.857	20.000
<b>Area in square metres</b>	34.913	35.604	37.095	29.400	19.600
<b>Final Weight in lb.</b>	51.000	58.000	64.000	52.000	11.000
<b>Final Weight in kg</b>	22.126	27.217	29.030	24.123	5.103
<b>Weight per m2 in grams</b>	633.766	764.421	782.575	820.503	260.352

Table 1b

<b>Drapery:</b>	<b>HONDSCHOOTE</b>	<b>HONDSCHOOTE</b>	<b>ESSEX</b>	<b>ESSEX</b>
<b>City/Region</b>			<b>(Colchester)</b>	<b>(Colchester)</b>
<b>Date of Ordinance</b>	<b>1571</b>	<b>1571</b>	<b>1579</b>	<b>1579</b>
<b>Name of Textile</b>	Single Say	Double Say	Says:	Bays:
<b>Additional Names</b>	Small	Small	broad	Single
<b>Origin of Wools</b>	Flanders, Friesland	Flanders, Friesland	English:	English:
<b>Wool Types</b>	Scotland, Pomerania	Scotland, Pomerania	long-stapled	worsted warp; woollen weft
<b>Length on Loom:</b> <b>ells/yds</b>	40.000	40.000	n.s.	n.s.
<b>Length on Loom:</b> <b>metres</b>	28.000	28.000	n.s.	n.s.
<b>Width on Loom:</b> <b>ells</b>	n.s.	1.438	n.s.	n.s.
<b>Width on Loom:</b> <b>metres</b>	n.s.	1.006	n.s.	n.s.
<b>Weight on Loom:</b> <b>lb.</b>	n.s.	n.s.	n.s.	n.s.
<b>Weight on Loom:</b> <b>kg.</b>	n.s.	n.s.	n.s.	n.s.
<b>Final Length:</b> <b>ells/yds</b>	35.000	35.000	10.000	35.000
<b>Final Length :</b> <b>metres</b>	24.500	24.500	9.398	31.953
<b>Final Width:</b> <b>ells/yds</b>	0.875	1.625	1.000	1.000
<b>Final Width:</b> <b>metres</b>	0.613	1.138	0.940	0.940
<b>No. of Warps</b>	n.s.	1800.000	n.s.	n.s.
<b>Warps per cm</b> <b>(fulled)</b>	n.s.	15.824	n.s.	n.s.
<b>Area in square</b> <b>metres</b>	15.006	27.869	8.833	30.029
<b>Final Weight in lb.</b>	11.000	16.000	2.750	22.000
<b>Final Weight in kg</b>	5.103	7.422	1.247	9.979
<b>Weight per m2 in</b> <b>grams</b>	340.052	266.334	141.193	332.307

- a. Flemish ell in metres 0.700
- b. Ghent pound in grams 433.850
- c. Bruges pound in grams 463.900
- d. Mechelen ell in metres 0.689
- e. Mechelen pound in grams 469.250
- f. English pound avoirdupois 453.593
- g. English cloth yard (37 in): 0.940

\*\*\*A similar version of the above table is reproduced in: Kathrine Vestergård Pedersen / Marie-Louise B. Nosch (eds.), *The Medieval Broadcloth. Changing Trends in Fashions, Manufacturing and Consumption*, Oxford / Oakville 2009, pp. 10–11

**Note:** the areas, in square metres, and the weights per square metre are calculated on a computer up to seven decimal places; because of rounding areas, calculations using just the three decimal places in this table may give different, and faulty, results.

**Sources:**

Georges Espinas / Henri Pirenne (eds.), *Recueil de documents relatifs à l'histoire de l'industrie drapière en Flandre: Ire partie: des origines à l'époque bourguignonne*, 4 vols., Brussels, Commission royale d'histoire, 1906–1924; Octave Delepierre / M. F. Willems (eds.), *Collection des keuren ou statuts de tous les métiers de Bruges, Ghent 1842*; Marc Boone, *Nieuwe teksten over de Gentse draperie: wolaanvoer, productiewijze en controlepraktijken (ca. 1456–1468)*, in: *Bulletin de la commission royale d'histoire de Belgique*, 154 (1988), 40, doc. no. 3:v; M. Lameere / H. Simont (eds.), *Recueil des ordonnances des Pays Bas: deuxième série, 1506–1700*, vol. V, Brussels 1910; *Stadsarchief Leuven*, no. 1526, fo. 203r–10v; Great Britain, Record Commission, *Statutes of the Realm*, 6 vols. London 1810–22, Vol. IV:i, 136–7 (5–6 Edward VI, cap. 6, pt. 1); H. De Schryver, *De oude landmaten in Vlaanderen*, Brussels 1968, pp. 15–8; Émile Coornaert, *Une industrie urbaine; du XIVE au XVIIe siècle: l'industrie de la laine à Bergues-Saint-Winoc*, Paris 1930; Émile Coornaert, *La draperie-sayetterie d'Hondschoote, XIVE–XVIIIe siècles*, Paris 1930; Florence Edler, *Le commerce d'exportation des sayes d'Hondschoote vers Italie d'après la correspondance d'une firme anversoise, entre 1538 et 1544*, *Revue du Nord*, 22 (1936), pp. 255–6; Guy De Poerck, *La draperie médiévale en Flandre et en Artois: Technique et terminologie*, 3 vols., Bruges 1951; Patrick Chorley, *The Cloth Exports of Flanders and Northern France During the Thirteenth Century: A Luxury Trade?*, *Economic History Review*, Second Series, 40 (1987), pp. 349–79; A. P. Usher, *The Industrial History of England*, Boston 1920, p. 200; J. E. Pilgrim, *The Rise of the "New Draperies" in Essex*, *University of Birmingham Historical Journal*, 7 (1959–60), pp. 36–59.



1	15	16	17	18	19
Year	Value of the Brabant Basket of Consumables in d. groot Flemish	Value of Single Say in Baskets of Consumables	Value of Single Say in Baskets of Consumables	Value of Ghent Dickedinnen in Baskets of Consumables	Value of Mechelen Rooslaken in Baskets of Consumables
1535	268.733			12.637	9.847
1536	297.467			11.497	8.895
1537	254.333			13.683	10.325
1538	295.533	0.785	1.850	11.775	9.258
1539	300.400	0.755	1.745	11.984	9.108
1540	291.133	0.688	1.617	9.480	9.650
1541	278.000	0.759	1.740	10.360	10.105
1542	293.600	0.685	1.639	11.935	9.155
1543	324.200	0.580	1.314	10.364	8.377
1544	351.067	0.621	1.328	9.571	6.843
<b>Mean of 1538-44</b>	304.848 arithmetic	0.689 harmonic	1.580 harmonic	10.685 harmonic	8.804 harmonic

\*\*\*A similar version of the Table 2 is reproduced in: Pedersen / Nosch (eds.), *Medieval Broadcloth*, pp. 14–15

**Sources:**

**Ghent:** Stadsarchief Gent, Stadsrekeningen 1534/5–1544/5, Reeks 400: nos.46–52;

**Mechelen:** Stadsarchief Mechelen, Stadsrekeningen 1534/5–1544/5, nos. 209–19;

**Antwerp:** Herman Van der Wee, *Growth of the Antwerp Market and the European Economy, 14th to 16th Centuries*, 3 vols., The Hague 1963, Vol. I, pp. 457–68 (Appendix 39);

**Hondschoote:** Henri De Sagher et al (eds.), *Recueil de documents relatifs à l'histoire de l'industrie drapière en Flandre, deuxième série*, Vol. II, Brussels 1954, pp. 362–69, no. 290; pp. 378–81, no. 291; p. 415, no. 299.

Émile Coornaert, *La draperie-sayetterie d'Hondschoote, XIVE-XVIIIe siècles*, Paris 1930; calculated from Appendix IV, pp. 485–90.

Florence Edler, *Le commerce d'exportation des sayes d'Hondschoote vers Italie d'après la correspondance d'une firme anversoise, entre 1538 et 1544*, *Revue du Nord*, 22 (1936), pp. 249–65.

**List of References**

**Archival Sources:**

Stadsarchief Gent, Stadsrekeningen 1534/5–1544/5, Reeks 400: nos.46–52

Stadsarchief Leuven, no. 1526

Stadsarchief Mechelen, Stadsrekeningen 1534/5–1544/5, nos. 209–19

**Published Documents:**

Marc Boone, Nieuwe teksten over de Gentse draperie: wolaanvoer, productiewijze en controlepraktijken (ca. 1456–1468), *Bulletin de la commission royale d'histoire de Belgique*, 154 (1988), pp. 1–61

Henri De Sagher et al. (eds.), *Recueil de documents relatifs à l'histoire de l'industrie drapière en Flandre, deuxième série*, Vol. II, Brussels 1954, pp. 362–69, no. 290; pp. 378–81, no. 291; p. 415, no. 299

Octave Delepierre / M. F. Willems (eds.), *Collection des keuren ou statuts de tous les métiers de Bruges*, Ghent 1842

Georges Espinas / Henri Pirenne (eds.), *Recueil de documents relatifs à l'histoire de l'industrie drapière en Flandre: Ire partie: des origines à l'époque bourguignonne*, 4 vols., Brussels 1906–1924

Great Britain, Record Commission, *Statutes of the Realm*, 6 vols. (London, 1810–22), Vol. IV:i, 136–7 (5–6 Edward VI, cap. 6, pt. 1)

M. Lameere / H. Simont (eds.), *Recueil des ordonnances des Pays Bas: deuxième série, 1506–1700*, vol. V, Brussels 1910

**Secondary Sources**

Carus-Wilson, Eleanora M., *An Industrial Revolution of the Thirteenth Century*, *Economic History Review*, First Series, 11 (1941), reprinted in her *Medieval Merchant Venturers: Collected Studies*, London 1954, pp. 183–211

Cavaciocchi, Simonetta (ed.), *La seta in Europa sec. XIII–XX: atti della 'Ventiquattresima Settimana di studi'*, 4–9 maggio 1992, Istituto internazionale di storia economica F. Datini, Florence 1993

Childs, Wendy, *The English Export Trade in Cloth in the Fourteenth Century*, in: Richard Britnell / John Hatcher (eds.), *Progress and Problems in Medieval England: Essays in Honour of Edward Miller*, Cambridge / New York 1996, pp. 121–47

Chorley, Patrick, *The Cloth Exports of Flanders and Northern France During the Thirteenth Century: A Luxury Trade?*, *Economic History Review*, Second Series 40:3, (1987), pp. 349–79

Chorley, Patrick, *English Cloth Exports During the Thirteenth and Early Fourteenth Centuries: The Continental Evidence*, *Historical Research: The Bulletin of the Institute of Historical Research*, 61:144 (1988), pp. 1–10

Chorley, Patrick, *The Evolution of the Woollen, 1300–1700*, in: Negley B. Harte (ed.), *The New Draperies in the Low Countries and England, 1300–1800*, *Pasold Studies in Textile History* no. 10, Oxford / New York 1997, pp. 7–34

Coornaert, Emile, *La draperie-sayetterie d'Hondschoote, XIVe–XVIIIe siècles*, Paris 1930

Coornaert, Emile, *Une industrie urbaine du XIVe au XVIIIe siècle: l'industrie de la laine à Bergues-Saint-Winoc*, Paris 1930

Coornaert, Emile, *Draperies rurales, draperies urbaines: l'évolution de l'industrie flamande au moyenâge et au XVI siècle*, *Belgische tijdschrift voor filologie en geschiedenis/Revue belge de philologie et d'histoire*, 28 (1950), pp. 60–96

Craeybeckx, Jan, *L'industrie de la laine dans les anciens Pays-Bas méridionaux de la fin du XVIe au début du XVIIIe siècle*, in: Marco Spallanzani (ed.), *Produzione, commercio e consumo dei panni di lana*, Florence 1976, pp. 21–43

De Poerck, Guy, *La draperie médiévale en Flandre et en Artois: Technique et terminologie*, 3



vols., Bruges 1951

De Schryver, H., *De oude landmaten in Vlaanderen*, Brussels 1968

Edler, Florence, *Le commerce d'exportation des sayes d'Hondschoote vers Italie d'après la correspondance d'une firme anversoise, entre 1538 et 1544*, *Revue du Nord*, 22 (1936), pp. 255–6

Federico, Giovanni, *Silk Industry*, in: Joel Mokyr (ed.), *The Oxford Encyclopedia of Economic History*, 5 vols., Oxford / New York 2003, vol. 4, pp. 483–91

Lanaro, Paola (ed.), *At the Centre of the Old World: Trade and Manufacturing in Venice and the Venetian Mainland, 1400–1800*, Publications of the Centre for Reformation and Renaissance Studies: Essays and Studies no. 9 (CRRSS: Victoria University in the University of Toronto 2006)

Malanima, Paolo, *The First European Textile Machine*, *Textile History*, 17 (1986), pp. 115–28

Mola, Luca, *La seta in Italia dal Medioevo al Seicento: dal baco al drappo*, Marsilio 2000

Mola, Luca, *The Silk industry of Renaissance Venice*, Baltimore 2000

Munro, John H., *Wool, Cloth and Gold: The Struggle for Bullion in Anglo-Burgundian Trade, 1340–1478*, Brussels / Toronto 1973

Munro, John H., *Industrial Protectionism in Medieval Flanders: Urban or National?*, in: Harry Miskimin / David Herlihy / A. L. Udovitch (eds.), *The Medieval City*, New Haven / London 1977, pp. 229–67; reprinted in John Munro, *Textiles, Towns, and Trade: Essays in the Economic History of Late-Medieval England and the Low Countries*, Variorum Collected Studies series CS 442, Aldershot / Brookfield 1994

Munro, John H., *Wool-Price Schedules and the Qualities of English Wools in the Later Middle Ages, ca. 1270–1499*, *Textile History*, 9 (1978), pp. 118–69; reprinted in John Munro, *Textiles, Towns, and Trade: Essays in the Economic History of Late-Medieval England and the Low Countries*, Variorum Collected Studies series CS 442, Aldershot / Brookfield 1994

Munro, John H., *The 1357 Wool-Price Schedule and the Decline of Yorkshire Wool Values*, *Textile History*, 10 (1979), pp. 211–19; reprinted in John Munro, *Textiles, Towns, and Trade: Essays in the Economic History of Late-Medieval England and the Low Countries*, Variorum Collected Studies series CS 442, Aldershot / Brookfield 1994

Munro, John H., *The Medieval Scarlet and the Economics of Sartorial Splendour*, in: Negley B. Harte / Kenneth G. Ponting (eds.), *Cloth and Clothing in Medieval Europe: Essays in Memory of Professor E. M. Carus-Wilson*, *Pasold Studies in Textile History No. 2*, London 1983), pp. 13–70; reprinted in John Munro, *Textiles, Towns, and Trade: Essays in the Economic History of Late-Medieval England and the Low Countries*, Variorum Collected Studies series CS 442, Aldershot / Brookfield 1994

Munro, John H., *Bullion Flows and Monetary Contraction in Late-Medieval England and the Low Countries*, in John F. Richards (ed.), *Precious Metals in the Later Medieval and Early Modern Worlds*, Durham, North Carolina 1983, pp. 97–158

Munro, John H., *Silk*, in: Joseph R. Strayer et al. (eds.), *Dictionary of the Middle Ages*, 13 vols. (New York: Charles Scribner's Sons/MacMillan, 1982–88), Vol. 11: *Scandinavian Languages to Textiles, Islamic*, New York 1988, pp. 293–96.

Munro, John H., *Textile Technology*, in: Joseph R. Strayer et al. (eds.), *Dictionary of the Middle Ages*, 13 vols., New York 1982–88, Vol. 11: *Scandinavian Languages to Textiles, Islamic*, New York 1988, pp. 693–711; reprinted in John Munro, *Textiles, Towns, and Trade: Essays in the Economic History of Late-Medieval England and the Low Countries*, Variorum Collected Studies series CS 442, Aldershot / Brookfield 1994

Munro, John H., *Industrial Transformations in the North-West European Textile Trades, c. 1290–c. 1340: Economic Progress or Economic Crisis?*, in: Bruce M. S. Campbell (ed.), *Before the*

Black Death: Studies in the 'Crisis' of the Early Fourteenth Century, Manchester / New York 1991, pp. 110–48; reprinted in John Munro, *Textiles, Towns, and Trade: Essays in the Economic History of Late-Medieval England and the Low Countries*, Variorum Collected Studies series CS 442, Aldershot / Brookfield 1994

Munro, John H., *Industrial Entrepreneurship in the Late-Medieval Low Countries: Urban Draperies, Fullers, and the Art of Survival*, in: Paul Klep / Eddy Van Cauwenberghe (eds.), *Entrepreneurship and the Transformation of the Economy (10th–20th Centuries): Essays in Honour of Herman van der Wee*, Leuven 1994, pp. 377–88

Munro, John H., *Patterns of Trade, Money, and Credit*, in James Tracy / Thomas Brady Jr. / Heiko Oberman (eds.), *Handbook of European History in the Later Middle Ages, Renaissance and Reformation, 1400–1600, Vol. I: Structures and Assertions*, Leiden 1994), pp. 147–95

John Munro, *Textiles, Towns, and Trade: Essays in the Economic History of Late-Medieval England and the Low Countries*, Variorum Collected Studies series CS 442, Aldershot / Brookfield 1994

Munro, John H., *Urban Wage Structures in Late-Medieval England and the Low Countries: Work-Time and Seasonal Wages*, in: Ian Blanchard (ed.), *Labour and Leisure in Historical Perspective, Thirteenth to Twentieth Centuries*, Stuttgart 1994, pp. 65–78

Munro, John H., *Anglo-Flemish Competition in the International Cloth Trade, 1340–1520*, *Publication du centre européen d'études bourguignonnes*, 35 (1995), pp. 37–60 [*Rencontres d'Oxford* (septembre 1994): *L'Angleterre et les pays bas bourguignonnes: relations et comparaisons, XVe–XVIe siècle*, ed. Jean-Marie Cauchies].

Munro, John H., *The Origins of the English 'New Draperies': The Resurrection of an Old Flemish Industry, 1270–1570*, in: Negley B. Harte (ed.), *The New Draperies in the Low Countries and England, 1300–1800*, Oxford / New York 1997, pp. 35–127

Munro, John H., *The Symbiosis of Towns and Textiles: Urban Institutions and the Changing Fortunes of Cloth Manufacturing in the Low Countries and England, 1270–1570*, *The Journal of Early Modern History: Contacts, Comparisons, Contrasts*, 3:1 (1999), pp. 1–74

Munro, John H., *The "Industrial Crisis" of the English Textile Towns, 1290–1330*, *Thirteenth-Century England: VII*, ed. Michael Prestwich / Richard Britnell / Robin Frame, Woodbridge (UK) 1999, pp. 103–41

Munro, John H., *The Low Countries' Export Trade in Textiles with the Mediterranean Basin, 1200–1600: A Cost-Benefit Analysis of Comparative Advantages in Overland and Maritime Trade Routes*, *The International Journal of Maritime History*, 11:2 (1999), pp. 1–30

Munro, John H., *The "New Institutional Economics" and the Changing Fortunes of Fairs in Medieval and Early Modern Europe: The Textile Trades, Warfare, and Transaction Costs*, *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte*, 88:1 (2001), pp. 1–47

Munro, John H., *Medieval Woollens: Textiles, Textile Technology, and Industrial Organisation, c. 800–1500*, in: David Jenkins (ed.), *The Cambridge History of Western Textiles*, 2 vols., Cambridge / New York 2003, Vol. I, ch. 4, pp. 181–227

Munro, John H., *Medieval Woollens: The Western European Woollen Industries and their Struggles for International Markets, c.1000–1500*, in: David Jenkins (ed.), *The Cambridge History of Western Textiles*, 2 vols., Cambridge / New York, Vol. I, ch. 5, pp. 228–324, 378–86 (bibliography)

Munro, John H., *Wage Stickiness, Monetary Changes, and Real Incomes in Late-Medieval England and the Low Countries, 1300–1500: Did Money Matter?*, *Research in Economic History*, 21 (2003), pp. 185–297

Munro, John H., *The Monetary Origins of the "Price Revolution.": South German Silver Mining,*

Merchant-Banking, and Venetian Commerce, 1470–1540, in: Dennis O. Flynn / Arturo Giráldez / Richard von Glahn (eds.), *Global Connections and Monetary History, 1470–1800*, Aldershot / Brookfield, Vt 2003, pp. 1–34

Munro, John H., Money, Wages, and Real Incomes in the Age of Erasmus: The Purchasing Power of Coins and of Building Craftsmen's Wages in England and the Southern Low Countries, 1500–1540, in: Alexander Dalzell / Charles G. Nauert, Jr. (eds.), *The Correspondence of Erasmus*, Vol. 12: Letters 1658–1801, January 1526–March 1527, Toronto 2003, Appendix, pp. 551–699

Munro, John H., Spanish Merino Wools and the Nouvelles Draperies: An Industrial Transformation in the Late-Medieval Low Countries, *Economic History Review*, Second Series 58:3 (2005), pp. 431–84

Munro, John H., Builders' Wages in Southern England and the Southern Low Countries, 1346–1500: A Comparative Study of Trends in and Levels of Real Incomes, in: Simonetta Cavaciocchi (ed.), *L'Edilizia prima della rivoluzione industriale*, secc. XIII–XVIII, *Atti delle "Settimana di Studi" e altri convegni*, no. 36, Istituto Internazionale di Storia Economica "Francesco Datini", Florence 2005, pp. 1013–76

Munro, John H., The Anti-Red Shift – to the Dark Side: Colour Changes in Flemish Luxury Woollens, 1300–1550, *Medieval Clothing and Textiles*, 3 (2007), pp. 55–95

Munro, John H., The Usury Doctrine and Urban Public Finances in Late-Medieval Flanders (1220–1550): Rentes (Annuities), Excise Taxes, and Income Transfers from the Poor to the Rich, in Simonetta Cavaciocchi (ed.), *La fiscalità nell'economia Europea*, secc. XIII–XVIII / *Fiscal Systems in the European Economy from the 13th to the 18th Centuries*, *Atti della "Trentanovesima Settimana di Studi"*, 22–26 aprile 2007, Fondazione Istituto Internazionale di Storia Economica "F. Datini", Prato, Serie II: *Atti delle "Settimane de Studi" et altri Convegni* 39, Florence 2008, pp. 973–1026

Munro, John H., Price Revolution, in: Steven N. Durlauf / Lawrence E. Blume (eds.), *The New Palgrave Dictionary of Economics*, 2<sup>nd</sup> edition, 6 vols., London / New York 2008, Vol. 6, pp. 631–34

Phelps Brown, E. Henry / Sheila V. Hopkins, Seven Centuries of the Prices of Consumables Compared with Builders' Wage-Rates, *Economica*, 23:92 (1956), pp. 296–314; reprinted in E. M. Carus-Wilson (ed.), *Essays in Economic History*, 3 vols., London 1954–62, vol. II, pp. 179–96, and also in E. H. Phelps Brown / Sheila V. Hopkins, *A Perspective of Wages and Prices*, London 1981, pp. 13–59

Pilgrim, J. E. , The Rise of the "New Draperies" in Essex?, *University of Birmingham Historical Journal*, 7 (1959–60), pp. 36–59

Spufford, Peter, *Monetary Problems and Policies in the Burgundian Netherlands, 1433–1496*, Leiden 1970

Usher, Allan P., *The Industrial History of England*, Boston 1920, p. 200.

Van Uytven, Raymond, Cloth in Medieval Literature of Western Europe, in: N. B. Harte / K. G. Ponting (eds.), *Cloth and Clothing in Medieval Europe: Essays in Memory of Professor E. M. Carus-Wilson*, *Pasold Studies in Textile History* 2, London 1983, pp. 151–83

Van der Wee, Herman, *Growth of the Antwerp Market and the European Economy (fourteenth–sixteenth centuries)*, 3 vols., The Hague 1963

Van der Wee, Herman, *Prijzen en lonen als ontwikkelingsvariabelen: Een vergelijkend onderzoek tussen Engeland en de Zuidelijke Nederlanden, 1400–1700*, in: *Album aangeboden aan Charles Verlinden ter gelegenheid van zijn dertig jaar professoraat, Gent 1975*, pp. 413–47; reissued in English translation (but without the tables) as ‘Prices and Wages as Development Variables: A Comparison Between England and the Southern Netherlands, 1400–1700,’ *Acta Historiae Neerlandicae*, 10 (1978), pp. 58–78; and reprinted in: Herman Van der Wee, *The Low Countries in the Early Modern World*, Aldershot 1993, pp. 223–41