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Monetary Policies, Guild Labour-Strife, and Compulsory Arbitration during the Decline of the Late-Medieval Flemish Cloth Industry, 1390 - 1435

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Monetary Policies, Guild Labour-Strife, and Compulsory Arbitration during the Decline of the Late-Medieval Flemish Cloth Industry, 1390 - 1435

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ABSTRACT:

This paper explores the impact of the Count of Flanders' monetary and wage policies upon the fortunes of the Flemish woollen cloth manufacturing industry in a crucial but penultimate phase of its irredeemable decline, from 1390 to 1435, when it was beginning to yield to the growing supremacy of the now rapidly expanding English cloth industry and trade. More narrowly (leaving larger issues of industrial decline to another paper), it focuses upon the sudden imposition and enforcement of Flemish monetary reforms in the early 1390s, after a half century of inflationary coinage debasements, which greatly exacerbated other existing forces promoting deflation more generally in north-west Europe. In the view of the count, his officials, and entrepreneurs in the cloth trades, this monetary reform could work effectively only if wages were cut proportionately; and such wage-cutting policies naturally provoked bitter resentment (even though the ongoing deflation in fact raised real wages). In the Flemish cloth industry, the only wage-earning artisans who were organized into a guild, and one that resembled a modern labour union, were the fullers, exclusively male workers, whose tasks were crucial in ensuring the luxury quality of the Flemish industry's chief exports. Their reaction to the post-Reform wage cuts of the 1390s was to go on strike (*uutgangen*), thus forcing the intervention of the count's officials, who imposed compulsory wage arbitration, establishing new wage contracts that gave the draper-entrepreneurs only half of the demanded cuts. One of these contracts specified the fullers' new wages in terms of *both* the silver and gold coinages, in an era when the gold:silver ratio was unusually low. After the Flemish count had resumed inflationary coinage debasements in 1416, leading to a rise in the gold:silver ratio (i.e., making gold coins more valuable in terms of the silver), some fullers' guilds now cited these contract provisions and demanded payment in gold coin, provoking new labour strife, which ended only with another monetary reform in 1433-5. The paper also poses and answers the question: why did the draper-entreprenuers not respond to this labour strife by displacing fullers with water-powered machines?

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I. Flemish Monetary Policies and the Cloth Industry

In August 1390, Philip the Bold, duke of Burgundy and ruler of Flanders (1384-1404), resolved a labour dispute in the small Flemish drapery of Kortrijk by imposing an unprecedented wage settlement upon its fullers and weaver-drapers guilds. Compulsory arbitration itself was by no means new in the chronic and often bloody strife between the weavers and fullers guilds in fourteenth-century Flanders; but the imposition of a wage cut, and one that was defined in terms of a recently-established bimetallic ratio, certainly was novel.[1] Furthermore, both the issues and provisions of this guild contract would strongly influence labour relations in the Flemish textile industry for the next half century.

The genesis of the labour conflict itself and the defining element in its resolution (lasting for over thirty years) was in fact an equally unprecedented monetary reform that Duke Philip had also imposed in that same year of 1390 -- unprecedented at least for medieval Flanders. This monetary reform, manifesting the duke's evident resolution to restore the prestige of both the Flemish government and its coinage, sharply reversed the traditional policy of coinage debasements that had dominated almost the entire reign of his predecessor. Those debasements had in fact been much more fiscal than monetary in nature, as Count Louis de Male continually sought supplementary finances for his government, and for warfare especially, from mint-seigniorage profits. In the 35 years from May 1349 to his death in February 1384, Count Louis had reduced the precious metal contents of the silver coinage by 53.1 per cent and of the gold coinage by 54.2 per cent.[2] In July 1384, just six months after becoming ruler of Flanders, Duke Philip made an abortive first

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[1] See below nn. 12, 24. Full citations for the footnote references will be found in the bibliography (List of References) attached as an appendix.

[2] The last debasement was in September 1383. See Van Werveke (1949a); Van Werveke (1949b), pp. 115-27; and Werveke (1931), pp. 1-15, but see revised monetary data in Blockmans (1979), pp. 69-94, and Munro (1981), pp. 71-116. In debasing both almost equally, Count Louis had been able to maintain a bimetallic ratio, approximately 10.4:1, that was consistently more favourable to silver than the current English mint ratio (a constant 11.16:1 in this era).For the bimetallic ratios, see Munro (1981), pp. 71-116; Munro (1983a), Table 10, pp. 148-50. An important component of any bimetallic ratio is the coined value of the mint-weight of fine metal, called the *traite* in Flemish documents. In Flanders, the mint-weight was

attempt to impose a monetary reform or *renforcement* by striking new though ill-planned coinages that were 21.0 per cent stronger in silver and 29.8 per cent stronger in gold. But all too quickly, Philip himself discovered a pressing need for mint revenues, especially for the aftermath of the Flemish civil war and then his Guelders war, while forced at the same time to defend his mints from French and Brabantine debasements. Thus, in four alterations between April 1386 and October 1388, he reduced the silver contents of his *groot* coinages by another 33.4 per cent overall.[3]

A year later he found a more propitious moment, in December 1389 and January 1390, to impose what, this time, did become a highly successful *renforcement*: strengthening the silver coinage by 31.6 per cent and the gold coinage even more, by 41.7 per cent.[4] That coinage *renforcement* had two very important and related economic consequences directly affecting the Flemish cloth industry: both in its wage payments and its export prices.

The first involved the bimetallic ratio, i.e., the ratio between the official coined values of gold and silver (shown in Table 1). Bimetallism, however, may be a somewhat misleading term in this context, because both the Flemish and English economies then in fact operated on what was essentially a silver standard supplemented by gold. Their moneys-of-account or pricing systems were anchored in their current

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the *marc de Troyes* of 8 onces (= 244.753 g), and the silver standard was *argent-le-roy*, 23/24th pure (95.833 per cent); the standard for gold was 23.875/24.000 carats (99.479 per cent). The *traite* = face value x *taille* (number of coins cut per marc)/fineness of the coin. The sum of the mint's price for bullion + the prince's seigniorage fee + the mint-master's brassage fee (all per marc of fine metal) = the *traite* in livres groot. There are in fact three bimetallic mint ratios to consider: the ratio of the mint's silver bullion price to the gold *traite;* the ratio of the mint's gold bullion price to the silver *traite*; and the ratio of the two *traites*. The gap between these ratios was determined by the sum of the relative mint fees on the two metals, which, as noted (n. 25), limited effective arbitrage trade in the metals. In this study, only the ratio of the *traites*, calculated in terms of kilograms of pure metal, is employed.

[3] For a 100,000 Flemish subsidy in gold francs for 'pacifying' Flanders and for the Guelders war, see Gilliodts-Van Severen (1871-78), III, no. 695, p. 111: 22 February 1388. The silver coinage was debased by 13.5 per cent overall in Apr-Oct. 1386, by another 16.4 per cent in April 1387, and finally by 8.0 per cent in Oct. 1388. See especially Cockshaw (1970-1), pp. 107-41; Munro (1973), pp. 43-54; Munro (1981), pp. 71-116; and also Munro (1984b), pp. 263-94; Munro (1984a), Table 10, pp. 148-49.

[4] The silver contents of the single groot (1.018 g) were restored to about the same level of 1380 (1.011 g) and again for 1386 (1.022g). The double groot was strengthened by 31.8 per cent. See n. 39 and Munro (1981), pp. 85-6, p. 110, Table 8.

silver coinages, which also governed almost all their domestic transactions, while gold provided the major though not exclusive medium for international trade and finance. Thus the Flemish drapers made their wage payments in silver coins exclusively, while purchasing their imported dyestuffs and wools, now almost entirely English, with gold coins.[5] Normally, these drapers also sold their finished woollens for gold coins; but as much evidence suggests, they initially priced them in the silver-based money of account, the *livre gros* or *pond groot*, converting those prices into gold coins -- domestic or foreign -- by the prevailing exchange rates. The accompanying Table 2 shows the prices of Ghent's *dickedinnen* broadcloths in both *pond groot (livres gros)* and stable Florentine gold florins -- the 'dollar of the Middle Ages' -- during first the debasement era of Louis de Male and then during the subsequent *renforcement* era of Duke Philip the Bold.[6]

In historical perspective, we can now see that Count Louis had carefully managed his debasements to maintain a fairly constant bimetallic ratio, averaging approximately 10.4:1, which was consistently more favourable to silver than the current English mint ratio (a constant 11.16:1 in this era), and more in accordance with current international ratios.[7] That Flemish bimetallic ratio had ensured a roughly adequate balance in the mint outputs between the gold and silver coinages, while England's much higher mint ratio, in contrast, had meant that over 95 per cent of her fourteenth-century mint outputs were struck in gold

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[5] For English wools, see below n.

[6] It will be noted that the during the former era, the silver-based price rose 186 per cent while the gold-based price rose much less, though still by 51 per cent . The significance of these price changes is discussed below on p.

[7] Munro (1981), pp. 71-116; Munro (1983a), Table 10, pp. 148-50. An important component of any bimetallic ratio is the coined value of the mint-weight of fine metal, called the *traite* in Flemish documents. In Flanders, the mint-weight was the *marc de Troyes* of 8 onces (= 244.753 g), and the silver standard was *argent-le-roy*, 23/24th pure (95.833 per cent); the standard for gold was 23.875/24.000 carats (99.479 per cent). The *traite* = face value x *taille* (number of coins cut per marc)/fineness of the coin. The sum of the mint's price for bullion + the prince's seigniorage fee + the mint-master's brassage fee (all per marc of fine metal) = the *traite* in livres groot. There are in fact three bimetallic mint ratios to consider: the ratio of the mint's silver bullion price to the gold *traite;* the ratio of the mint's gold bullion price to the silver *traite*; and the ratio of the two *traites*. The gap between these ratios was determined by the sum of the relative mint fees on the two metals, which, as noted (n. 25), limited effective arbitrage trade in the metals. In this study, only the ratio of the *traites*, calculated in terms of kilograms of pure metal, is employed.

coins.[8]

Clearly the current bimetallic or exchange ratio was an important consideration for the Flemish cloth industry; and the 1390 *renforcement*, by strengthening the gold coinage so much more than the silver, automatically altered the Flemish bimetallic ratio even more even more strongly in favour of silver -- from 10.41 to 9.68:1. Very likely that was too strong a shift, especially when the international bimetallic ratios were once more rising in favour of gold.[9] That change also meant, necessarily, an exactly proportional reduction in the official exchange rate on the new Flemish gold noble, first struck in 1388, from 8s 6d to 6s 0d *groot* Flemish (from 102d to 72d *groot*).[10] Consequently, if the silver-based price of Ghent *dickedinnen* shown in Table 2 had not changed from the £7 10s 0d *groot* indicated for the early 1380s -- and undoubtedly it was much higher during the inflationary late-1380s (when price data are regrettably lacking) -- its gold price would have risen from 17.65 to 25.0 Flemish nobles after the 1390 *renforcement*, possibly pricing those woollens out of the market. But instead, as Table 2 shows, Ghent cloth prices dropped substantially in both *livres groot* and Florentine florins, by and from the 1390s.

Presumably one benefit that the Flemish drapers had derived from that change in the bimetallic ratio was a reduction in the price of the gold nobles necessary for purchasing English wools, which were now accounting for over 70 per cent of their total cloth-manufacturing costs.[11] Unfortunately for the Flemish there was still no effective substitute for English wools, Europe's finest, in luxury cloth production (not even

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[8] See Munro (1981), Tables 1-8, pp. 102-11; and Munro (1983), Tables 1-10, pp. 131-53.

[9] Having dropped so precipitously in the 1330s, the ratio underwent some recovery in this same period (at Venice, rising from 9.4:1 in 1350 to 11.4:1 in 1380), indicating an increase in the relative value or purchasing power of gold. See Spufford (1986), Graph 4, p. lxi, and Table II, p. lxiii; Lane-Mueller (1985), pp. 364-97.

0. Monetary ordinance of 20 December 1389 published in Bartier-Van Nieuwenhuysen (1965), I, no. 232, pp. 349-50. See Van Werveke (1938), pp. 336-47; Munro (1973), pp. 49-55; and Munro (1981), pp. 83-88. The change in the exchange rate, -29.4 per cent , is again inversely proportional to the strengthening of the gold coinage (+41.7 per cent). Thus [1/(1.00 + 0.417) - 1] = -0.2943. See also Table 2, for the fall in the exchange rate on the Florentine florin, which was slightly less, -25.9 per cent .

[11] For relative production costs see Munro (1977), Tables 13.2 and 13.3; and Munro (1983c), Table 3.12, p. 52.

Spanish *merino*, yet); and a major reason for the rise in the gold prices of Flemish woollens in Table 2 was the steep increase in England's taxation of wool exports, especially from the 1360s.[12] Indeed by recently issuing these new Flemish nobles, from October 1388, as slightly inferior imitations of the widely-accepted English nobles, Duke Philip had already facilitated those wool purchases, while also maintaining a respectable volume of gold minting during the 1390s, despite the unfavourable bimetallic ratio.[13] Nevertheless that necessary reduction in cloth prices also required some substantial cut in the wages of textile artisans.

II: The 1390 Monetary Reform, Deflation, and the Problem of Nominal Wage-Stickiness

Historically, however, imposing such wage cuts has never been an easy task; and labour historians are familiar with the so-called ratchet effect in wage-determination: i.e., that nominal or money wages, even if they do lag behind consumer prices, historically demonstrate much greater *upward* flexibility during inflation than any countervailing *downward* movement during deflation. As Adam Smith, the founding father of modern of Classical Economics, observed over two centuries ago in *The Wealth of Nations* [1776], 'in many places the money price of labour remains uniformly the same sometimes for half a century together.'[14] Most of Smith's disciples, however, were less cognizant of this historic problem of [downward] wage-

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[12] For English and Spanish wool qualities and prices, see Munro (1978), pp. 118-69. English customs and subsidies imposed as specific duties on wool exports from the outset of the Hundred Years' War, averaged 47.82s per woolsack of 364 lb from 1340-9 to 1380-9, ranging from a low of 42.5s in the 1360s to a high of 50.0s in the 1370s. In the 1380s, they amounted to 43 per cent of the mean wholesale value of exported English wools (£5.756 per sack, f.o.b). English wools had become all the more expensive after the establishment of the Calais Staple in 1363, to control wool sales to northern Europe as a quasi-monopoly (imposing uniform wool prices per county of origin), which more effectively passed the tax incidence on to the foreign buyers, chiefly in the Low Countries. With general deflation from the late 1370s, nominal wool prices declined, but not as much as the price level, so that real prices had in fact increased. For evidence and analysis, see Lloyd (1977), pp. 144-224; Munro (1977), Table 13.1, pp. 254-55; Munro (1984a), Table B-4, pp. 102-03; Munro (1991a), pp. 133-38; Ormrod (1990), p. 206, Table 3; Ormrod (1991), pp. 167-75. See also below p. xx and n.

[13] See Munro (1973), pp. 43-63; Munro (1981), pp. 83-88. After Duke Philip had successfully adjusted his mint prices, his subjects were able to obtain 31 counterfeit Flemish nobles per marc (244.753 g) of 23.75 carats gold compared to 30.789 good English nobles per marc at England's Calais mint (= 30.951 nobles per marc of 23.875 fineness, or 44.25 per Tower Pound of 349.914 g, with that fineness).

[14] Smith [1776], 5th edn. (1789), ed. Cannan (1937), p. 74.

stickiness; and, in during this century's Great Depression, John Maynard Keynes caustically observed, in his famous *General Theory* [1936], that 'Classical Theory has been accustomed to rest the supposedly self-adjusting character of the economic system on an assumed fluidity of money-wages.' On the contrary, stated Keynes:[15]

> To suppose that a flexible wage policy is a right and proper adjunct of a system, which on the whole is one of *laissez-faire*, is the opposite of the truth. It is only in a highly authoritarian society, where sudden, substantial, all-round changes could be decreed that a flexible wage-policy could function with success. One can imagine it in operation in [Fascist] Italy, [Nazi] Germany or [Soviet] Russia, but not in France, the United States or Great Britain.

Although Burgundian Flanders was, of course, far from being such an authoritarian society, both the ducal and urban authorities immediately sought to impose proportional reductions in all payments;[16] and a wage reduction inversely proportional to the silver *renforcement* of 31.6 per cent would have been exactly 24.0 per cent .[17] At Bruges, the daily money-wages of master masons, carpenters, and other building craftsmen, which had risen during the inflationary 1380s, were abruptly and arbitrarily cut by 25 per cent , from 12d to 9d *groot*, in early 1390, as were those of their journeymen, from 6d to 4d 12 mites (4.5d).[18] According to some contemporary reports, such wage reductions did produce riots and considerable social unrest in Bruges and other Flemish cities.[19] That year of unrest was evidently not the opportune moment to reduce the wages of Bruges' policemen; and their wage reduction, a rather smaller one of 16.7 per cent , from

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[15] Keynes (1936), pp. 257, 269.

[16] See the monetary ordinance of 5 December 1390, by which Duke Philip allowed Ghent, Bruges, Ypres, and the Franc 'ordener de la maniere du paiement desdictes rentes a heritage ou a vie, cense et loages de maisons,' except for properties and debts of the duke and nobility, for whom all payments were to be reckoned at the new rate of 72d for the noble. Bartier-Van Nieuwenhuysen (1965), I, no. 262, pp. 399-400. See Van Werveke (1931), pp. 251-52; Van Werveke (1938), pp. 341-43; De Roover (1948), pp. 227-28.

[17] By the monetary formula for a *renforcement*: $1/(1 + x) - 1$, where x = the percentage change in the silver content of the groot. Thus $[1/(1.316) - 1] = 0.760 - 1 = - 0.240$ or 24.0 per cent .

[18] Stadsarchief Brugge, Stadsrekeningen 1388/89 to 1399/1400: wage payments for building craftsmen in the 'werken' accounts. See also Table 7.

[19] In Gilliodts-van Severen (1871-78), III, no. 706, pp. 134-5, 140-2 (January 1390). See also Van Werveke (1938), pp. 341-44; Van Werveke (1931), pp. 6-15; De Roover (1948), pp. 227-29; Van der Wee (1963), II, pp. 14-18, 29-30.

6d to 5d *groot* daily, was strategically delayed until late in 1397.[20]

In retrospect, civil disturbances in Flanders were rather less pronounced than might have been expected. But presumably only the guild artisans, a minority, were in position to voice strong objections; and evidently many, if not all of them, grudgingly accepted the argument that their new wages, while nominally lower, were being paid in *strong* rather than *weak* money. Quite evidently wage reductions were imposed much more easily under conditions of a publicly promulgated coinage *renforcement*, when the public could readily perceive the physical differences between the new and old coinages, than under deflationary conditions without any such coinage changes.[21]

III: Wages, Labour Strife, and The Fullers' Guilds of Kortrijk, Wervik, and Ghent in the 1390s

Nevertheless the various attempts by Flemish weaver-drapers to impose similar wage cuts during the early 1390s did produce some labour strife in the Flemish cloth industry, though only the fullers have left us any concrete records of concerted opposition, and only in three drapery towns: the aforementioned Kortrijk, Wervik, and Ghent. That opposition of course depended upon the relative strength of their *ambachten* or guilds. The weakest were evidently the Ghent fullers, who, in 1361, had lost both their representation in the town government and the right to select their own leaders.[22] Evidently they acquiesced without much struggle in a quite brutal 29 per cent reduction in their combined money-wage, for a master

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[20] In 1383, during the Artevelde revolt (1379-85) and just before the initial, abortive *renforcement* of 1384, the daily wages of Bruges master craftsmen in the building trades had been reduced even more sharply, from 12d to 8d groot, but were raised to 9.33d in 1386 and then fully restored to 12d in 1387. In 1386, just after the suppression of the Artevelde revolt, the daily wages of Bruges policemen had been raised from 6d to 7.67d (7d 16 mites) groot, but were set back to 6d in 1387. Note again that the policemen's daily wages were paid for a 365-day year. Data extracted from the Bruges municipal accounts: Stadsarchief Brugge, Stadsrekeningen 1382/83 to 1397/98. Unfortunately the Ghent wage accounts are far too sparse to permit similar comparisons, and Ypres' *stadsrekeningen* now survive only from 1406 in the second copy deposited at the Lille Chambre des Comptes (now in the AGR).

[21] England, currently experiencing deflationary conditions [see n. 18 below], provides far less evidence of such cuts in nominal money wages.

[22] See n. below

and two journeymen in fulling a *maerclaken* broadcloth in three days: from 45d to 32d *groot*.[23] What makes their situation even more pitiful is that, unlike the building craftsmen in Bruges, they had not had an increase in money-wages since 1373;[24] and since the inflationary conditions of the 1380s still prevailed in 1390, their wage-reduction to 32d *groot* meant an overall decline of 41.5 per cent in their real wages since 1373.[25]

Somewhat more successful were the fullers in the small drapery town of Wervik, now a major leader of the younger, more aggressive, so-called *nouvelles draperies*, which were now faring rather better than the traditional draperies of the *drie steden* (Ghent, Ypres, Bruges), especially in Mediterranean markets.[26] Soon after the 1390 *renforcement*, the seigneur and bailiff of Wervik's feudal seigneury decreed an immediate reduction of 27 per cent in the fullers' pay: from 48d to 35d *groot* per cloth, which still left them better off than the Ghent fullers. Nevertheless, in May 1392, but rather too late, the Wervik fullers' guild appealed this decree to the ducal Council of Flanders. Ignoring the current condition of their Ghent brethren, the Wervik

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[23] Rates deduced from texts in Espinas-Pirenne (1906-24), II, no. 492, pp. 535-37; Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 2208; and especially Rijksarchief van Oost Vlaanderen te Gent, Oostenrijks Fonds, layette 2 (for 2 May 1423): 'desquelz [desdiz foulons] ils n'avoient et ne leur en vouloit en baillier que trente deux gros ... et est salaire trop petit...' See also Van Werveke (1931), pp. 4-14; Nicholas (1987), p. 130; and the following note.

[24] Even though the weaver-drapers had crushed the 1373 strike, Count Louis de Male (no friend of the weavers) had then intervened and increased their wage to 45d groot. Text of 4 September 1373 in Rijksarchief Van Oost-Vlaanderen, Oostenrijks Fonds, layette 1; provisions also repeated in *Ibid*, layette 2 (2 May 1423). See also Espinas-Pirenne (1906-24), II, no. 485, pp. 526-27 (ordinances banning strikes); no. 491, pp. 533-35 (letters of the *deken* of weavers guild submitting dispute with fullers to arbitration); no. 492, pp. 535-37: Ghent fullers seek the count's pardon (who awards a wage of 45d per *maerclaken*). We do not know the earlier wage. In January 1386, after their real wage had deteriorated by 27 per cent (as measured by this Flemish price index), the fullers' peaceful request for another increase now encountered a very hostile reaction from Count Louis' successor, Duke Philip. Fully supporting the drapers, he curtly told the fullers 'to be content' with their current wage, and furthermore decreed that henceforth any foreign fullers would be free to establish fulleries within Ghent. Duke Philip also rebuffed the fullers' demands for a change in their guild constitution. Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 2208; also published in Bartier-Van Nieuwenhuysen (1965), I, no. 88, pp. 123-4. See also Boone (1990a), pp. 133-34.

[25] See Table 7. In 1390, a wage of 35d groot per cloth would purchase 0.192 basket (priced at 166.55d groot), compared to 0.328 basket in 1373. Not until 1423, after renewed inflation and another strike, would the Ghent fullers obtain any further raise in their money wages. See below, pp.

[26] See Melis (1959), pp. 321 - 65; Melis (1962), pp. 219-43; Melis (1967), pp. 151-61; and Munro (1991a), pp. 114-19; and Appendix 4.1, pp. 143-48.

fullers contended that their wages should not be so reduced because the Bruges' fullers were still being paid as much in *strong money* as they had previously received in *weak money*. The ducal council, however, ruled 'in favour of the drapers' of Wervik and its bailiff, forcing the Wervik fullers to accept this new wage rate, which was subsequently ratified by the promulgation of the Wervik drapery *keuren* (ordinances) in October 1397.[27]

Of the three recorded disputes, the Kortrijk fullers, employed by a *nouvelle draperie* that rivalled Wervik's in importance, fared by far the best, perhaps because they had responded much earlier and much more vigorously in their protests. Like the Ghent fullers, they had also not received any increase in money wages since 1374, despite all the intervening debasement-induced inflation.[28] When the Kortrijk weaver-drapers attempted to impose a cut in their wages, though a more modest one of 22 per cent , from 41d to 32d per broadcloth (the same rate imposed at Ghent), the fullers guild appealed to Duke Philip's councillors for arbitration. In their counter-brief, the Kortrijk weaver-drapers made a most intriguing argument that would unwittingly cause them considerable grief in subsequent wage negotiations. They cited the central provisions of the 1390 of the *renforcement*, and its consequences, to justify their proposed wage cut: namely, the reduction in the exchange value of gold coins for which they were selling their woollens, and the increased value of the new silver coins with which they paid their fullers, i.e., wage payments in *strong* rather than *weak* money. In imposing the new wage of 36d *groot*, and thus a relatively minor 12 per cent wage-reduction, Duke Philip virtually split the difference between the weaver-drapers and the fullers. At the same time, however, he also took notice of the draper's monetary argument by explicitly stipulating that this new

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[27] De Sagher (1951-66), III, no. 553, pp. 445-6, 451-2; and no. 554:136, p. 468. The two journeymen were to receive 14d groot each and the master 7d, for a total of 35d per cloth in three days. The journeymen were also to receive another 1.25d groot (16d parisis) for scrubbing the cloths ('van erdene'). The Wervik *dickedinnen* broadcloth was to be 38 ells by 9.5 quarter ells on the loom.

[28] Again thanks to intervention from Count Louis de Male. Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 1103; partly published in Espinas-Pirenne (1906-24), I, no. 206, pp. 668-9; and in Bartier-Van Nieuwenhuysen (1965), I, no. 253, pp. 385-6. The only previous wage datum is for a wage increase to 15d 4 mites in 1348; in 1350, that wage represented 31.35 g of silver and 0.230 unit of a basket of consumables (priced at 65.67d groot, in Table 6). The new wage of 1374, at 41d, represented 45.67 g silver and 0.301 basket (priced at 136.15d groot).

wage was henceforth to be defined as equal to a half gold noble (Flemish), i.e., 3s or 36d *groot*.[29] But that wage-equivalence and the exchange rate on the noble depended upon maintaining a bimetallic ratio that had, in fact, virtually reached its historic nadir.[30]

The real winners of this Kortrijk labour contract were surely the fullers, who, despite the 12 per cent reduction in money-wages, soon found themselves much better off because of the stark deflation that quickly ensued, from the early 1390s. Presumably, the Flemish *renforcement*, which necessarily reminted the existing stock of debased silver coins into fewer stronger coins, was a major cause of that deflation. The fall in the mean Flemish price index over the 1390s, however, was somewhat greater than the direct monetary changes from *renforcement*: i.e., 30.3 per cent vs. 24.0 per cent .[31] Furthermore, a similarly severe if more prolonged deflation had struck England's economy even earlier, from the 1370s, even though her coinages had remained unaltered since 1351; and from peak (1370-74) to trough (1405-09) the mean English price index fell by 28.7 per cent .[32] In both England and Flanders, the livestock and industrial price-indices also

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[29] Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 1103; partly published in Espinas-Pirenne (1906-24), I, no. 206, pp. 668-9; and in Bartier-Van Nieuwenhuysen (1965), I, no. 253, pp. 385-6: 'les diz drapiers disans que ce estoit trop grand salaire et qu'ilz devoient estre contens de xxxii [32] gros, attendu que au temps de la dicte ordonnance [1373-4, of Louis de Male] la monnoie estoit plus feble que elle n'est de present, car le franc d'or valoit pour lors xxxvii [37] gros ou environ et aujourduy il ne vault que xxxiii [33], et selonc ce que la dicte monnoie estoit plus forte le salaire des diz foulons devoit estre diminue...' (In fact the silver coinage of 1374 was stronger than that of 1390). See above p. xx where the full gold noble was revalued to 6s 0d or 72d groot.

[30] See Table 1, and pp. below. The bimetallic ratio of 8.81:1 in December 1416 was artificially too low and could not be sustained.

[31] The Flemish price index used here, modelled on the Phelps Brown and Hopkins index for England (100 = mean value of the basket in 1450-74), fell from the peak of 126.4 in 1385-9, reflecting the debasements of those years, to a trough of 88.1 in 1395-9, and remained at that level, 88.3, in 1405-09. The reduction in the silver *traite*, because of the *renforcement*, as noted before, was from £5.337 to £4.050 groot per kg; and expressed in terms of the physical change in coinage : (1.00 + 0.316)/1 - 1 = 0.7598 - 1 = -0.2401. See Tables B-1 and B-3 in Munro (1984), pp. 96, 100.

[32] In the shorter span from 1375-79 to 1385-89, the Phelps Brown Hopkins price index fell from 145.2 to 102.2, or -29.6 per cent ; and again 100 = the mean value of the basket in 1450-74. See Phelps Brown & Hopkins (1956/81), p. 28; Table B-4 in Munro (1984), p. 102.

fell, and roughly in tandem with grain prices, as a further indication of genuine deflation.[33]

The extent of the Flemish deflation and the consequent rise in real wages can be seen in Graphs 2-3 and Tables 4-7. Thus, by 1395-9 the mean purchasing power of wages for the Kortrijk fullers was 26 per cent higher than it had been during the debasement years of 1385-9. In 1400, their real-wage was 45.5 per cent above what they had been earning when the 1390 contract was imposed: and in fact that was the highest real wage they had so far achieved. Faring even better were the building craftsmen in Bruges, despite the initial 25 per cent reduction in their money-wages. In the decade from 1385-9 to 1395-9 the mean purchasing power of those wages had risen by 30 per cent . Towards the end of that period, however, in 1396-7, those craftsmen had also secured a small increase or restoration in their nominal wages: the masters, from 9d to 10d; and journeymen, from 4.5d to 5d.[34]

In stark contrast was the plight of the hapless Ghent fullers. Having suffered a severe 29 per cent cut in money wages in 1390,[35] they did not manage to regain their real wages of 1385-9 until the very nadir of the deflation, in the late 1390s; and, even so, their mean real wage for 1395-9 was still 9 per cent below their 1380-4 mean (Table 4). They would, in fact, never regain that earlier level of real income during the period covered in this study (to 1435), and during the early fifteenth century their wages suffered a further

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[33] Thus the fall in their price indices cannot be explained by grain prices alone, despite their heavy weights in those indices: i.e., by the supposed effects of late-medieval depopulations on *relative* grain prices, through an alteration in the land:labour ratio. An alternative explanation for this deflation may be found in the evidence for a substantial fall in mint-outputs throughout north-west Europe during this very period; and, while those data may not be proof of a 'bullion famine,' they do indicate declining monetary *flows*, which may in turn be related to the economic factors accompanying depopulation and commercial dislocations.On arguments for a general 'bullion famine' in this period, see Day (1978), pp. 12-35; Miskimin (1989), especially essays nos. III, IV, VII, VIII, XI, XII; for my views, in which I place greater weight on a decline in velocity, see Munro (1981), pp. 71-116; Munro (1983a), pp. 97-158; Munro (1984a), pp. 31-122; Munro (1988b), pp. 387-423; Munro (1992), pp. ix-xiii. For the inability of credit instruments to counteract these deflationary forces, at least in late-fourteenth-century England, see Nightingale (1990), pp. 560-75. In Flanders, the debasements of the 1380s may have thus counteracted and delayed deflation; and it should also be noted that much of the Flemish mint-outputs in the 1390s represent the reminting of prior coin issues after the 1389/90 *renforcement*.

[34] Stadsarchief Brugge, Stadsrekeningen 1384-85 to 1399/1400: from the construction *werken* accounts.

[35] See above, p. xx and n. 49.

deterioration in purchasing power.

IV: Fullers' Guilds and Wage Disputes with the Resumption of Inflation, after 1415

The chief reason for that real-wage decline was, of course, yet another series of war- and debasement-induced inflations, which commenced shortly after Henry V's stunning victory over the French at Agincourt (October 1415), in the midst of the Burgundian-Armagnac civil war, both of which led to more direct Flemish involvement in the Hundred Years' War.[36] The subsequent Burgundian-Flemish coinage debasements and war-taxation, beginning in December 1416, evidently succeeded in disgorging large amounts of hoarded metals, as did the contemporary French debasements, and to a lesser extent, the English as well.[37] In the Low Countries, the consequence was not only almost inevitable inflation, but also, from June 1418, changes in the bimetallic ratios that more and more favoured gold (Table 1).

The latter changes meant, to be sure, that the new Flemish prince, Duke Philip the Good of Burgundy, was debasing his gold coins somewhat more heavily than the silver; and his very drastic gold debasements in the 1420s were undertaken, as he later intimated, both to finance and supply gold coins for his military expeditions in France and Holland.[38] Hence, as Table 1 shows, the bimetallic ratio rose from an absolute low of 8.81:1 (in 1416) to 9.67:1 in June 1418 and finally to an extraordinarily high ratio of 14.13:1 in July 1426.[39] At the same time, some of that rise in the bimetallic ratio was evidently due to international

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[36] See Vaughan (1966), pp. 193-227; Munro (1973), pp. 65-76.

[37] See Munro (1973), pp. 65-92; Munro (1983a), pp. Tables 1-8, pp. 131-46; Miskimin (1984), Table III, pp. 135-39; supplemented by Sussman (1990), pp. 152-61. England's 16.7 per cent silver debasement and recoinage of 1411-12, however, was relatively minor compared to the French and Burgundian changes, and with prevailing deflationary forces, there was almost no inflation, despite quite large mint outputs.

[38] In a speech before Ghent's *collatie* of craft-guild *dekenen* in January 1447, he stated that: 'You also well know how, during a lull in the war in France, I had to wage a burdensome and murderous war against the English in my lands of Holland, Zeeland and Friesland in order to protect Flanders ... This war...had cost me, besides all the heavy expenses that I incurred throughout this period in the French war, over a million gold *saluts*, which at first I was extremely ill-prepared to find.' From *Dagboek van Gent van 1447 to 1470*, ed. Victor Fris (Ghent, 1904), I, pp. 57-68, extracted in Vaughan (1970), pp. 307-08.

0. See Munro (1973), 65-92, Tables J-K, pp. 209-10; Munro (1981), Table 8, pp. 110-11; and especially Munro (1983), Table 10, pp. 150-51. The first debasement, of December 1416, had changed the mint ratio

market forces, reflecting a growing and greater relative scarcity of gold, which would raise the normal commercial ratio to about 12:1 by the mid-century.[40] Thus the combination of such inflationary debasements, deliberate manipulations of the mint ratios, and market forces all combined to force up the rates on the Flemish gold noble during the 1420s.

By 1422, those inflationary forces were provoking considerable labour unrest in Flanders. The Flemish price index that year was about 37 per cent higher than in 1399, the nadir of this era's deflation; and the exchange rate on the Flemish gold noble was now 7s or 84d *groot*. That noble, furthermore, was inferior to the original Flemish noble in both fineness and weight; and had it been that original, fuller-weight noble, its exchange rate would have been even higher (Table 1). Earlier, in 1419, the Kortrijk fullers had successfully petitioned Duke John the Fearless to reconfirm their 1390 labour contract: specifically that their wage be valued at a half gold noble; and subsequently his son and successor Philip the Good issued a similar decree. Sometime in 1421-22 the Kortrijk fullers demanded that this decree be enforced and that they be paid that stipulated wage of a half-noble, i.e., 42d *groot*.[41] The drapers, however, 'notwithstanding the great labour of the fullers and also the dearness of materials, of wood, fullers-earth [*erde*] and other things used in fulleries,' obdurately refused to pay a penny more than the current wage of 36d *groot*. Enraged, the Kortrijk fullers' guild went out on strike (*ledichganc*) in April 1422, deserting the drapery town. From then until December 1422, the Kortrijk magistrates and Philip's wife, Duchess Michelle, begged, entreated, and

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from 9.6:1 to 8.81:1, far too low to be maintained. See the next note.

[40] See Munro (1983), pp. 125-26, Table 10, pp. 148-51; Graphs I-III, pp. 156-58; Van der Wee (1963), Vol. I, Table XVI, pp. 131-2; Spufford (1986), Table II, p. lxii (for Venice: 12:1, in 1455-60); Spufford (1988), Table 7, p. 354. Since there are no significant new supplies of silver before the real commencement of the South German-Central European silver mining boom in the 1460s, the explanation cannot lie with silver money. On this, see Munro (1991b), pp. 119-83.

[41] Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 1120: decree of Philip the Good, dated 20 January 1423, citing the 1390 Kortrijk ordinance and an ordinance of his father dated 1419. The 1419 ordinance is also cited in the decree of 28 June 1434 (*Ibid*., no. 1127).

then ordered the fullers back to work, but in vain.[42]

The next month, in January 1423, Duke Philip himself intervened to resolve the strike by compulsory arbitration. Even though his carefully written judgement cited the provisions of the 1390 labour contract, of the 1419 and succeeding ordinances, he clearly decided that the Kortrijk drapers had put forth the more compelling case. They had contended that a wage of 42d *groot* per cloth was undeserved when it would be so much higher than the prevailing fullers' wages at Ghent, Ypres, 'and other towns' (though Bruges was conveniently not mentioned), while the woollens from Kortrijk's *nouvelle draperie* were neither as big nor as heavy as the traditional broadcloths from these three leading draperies, in the so-called *drie steden*. Duke Philip thus decreed that the Kortrijk fullers must return to work at the former prevailing wage of 36d *groot*, but with two concessions. First, the ducal government agreed to reimburse the fullers for their legal expenses (£60 *groot*); and secondly, he decreed that their wage would be increased if, as, and when the Flemish coinage was again changed.[43] Though Philip had much earlier promised the Flemish Estates not to alter the Flemish coinage again before 1433, and was then undertaking debasements only in his adjacent territories (Namur and Holland), war-related fiscal necessity soon forced him to break that promise within Flanders itself.[44]

Meanwhile, even before the Kortrijk dispute had been settled, the long-suffering Ghent fullers went out on strike, demanding an increase in their wage from the 32d *groot* per cloth, set in 1390, to 45d, specifically claiming the nominal wage that Count Louis de Male had awarded them in 1373, and a wage that they had enjoyed until 1390. The purchasing power of their current wage, it should be noted, was now 22 per cent below their mean real wage for 1395-1404.[45] Just the same, the weaver-drapers were in no position

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[42] Algemeen Rijksarchief, Trésor de Flandre, Series I, nos. 1116-1118.

[43] Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 1120.

[44] Munro (1973), pp. 65-92.

[45] The mean price-index for 1420-24 (135.95) was 21 per cent higher than the mean for 1400-04 (112.65). See Tables 5-7.

to award such a large wage increase of 41 per cent ; and the strike became, quite understandably, a bitter one. Thus, '*pour appaiser ledit débat*,' the Ghent magistrates and the ducal bailiff together requested Duke Philip's personal arbitration. This time he was much more sympathetic to the strikers; and, on 2 May 1423, he awarded the Ghent fullers a 25 per cent wage increase, to 40d *groot* per cloth.[46] While that was certainly a very substantial increase, subsequent inflation unfortunately meant that their real wage for the second half of the 1420s remained below the real-wage (based on 32d *groot*) that they had earned around 1400.

In settling both strikes, Duke Philip had extracted from the two fullers' guilds the solemn promise that they would never strike again, and that their guild leaders would always inform both their town governments and the ducal officials of any industrial disputes with the weaver-drapers. He had also rejected the Ghent fullers' request that guild self-government be restored to them, and decreed instead that their *gouverneur* be chosen each year by '*des plus notables des deux membres qui en ont le gouvernement*,' effectively by the Ghent *schepenen* or magistrates.[47] Not long afterwards, in March 1425, the fullers were severely condemned and some ring-leaders were exiled for having engaged in '*plusieurs poursuites tres aigres pour avoir nouvel gouvernement en leur dit mestier*;' and two years later, in July 1427, the Ghent fullers again went out on a full scale strike, deserting the town to seek refuge in the nearby county of Hainaut, while threatening to shut down the Ghent drapery by force, and conspiring with Ypres' fullers to demand wage increases.[48] By early 1428, however, the Ghent fullers' strike had been thoroughly crushed, with confiscations and the exile of the leaders; and there is no record of any further industrial strife at Ghent

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[46] Rijksarchief van Oost-Vlaanderen te Gent, Oostenrijks Fonds: Layette 2: 'pour le débat entre les bonnes gens du mestier des foulons en nostre ville de Gand dune part et les drapiers et bonnes gens du mestier des tisserans...' It should be noted, however, that this new wage (like the previous awards) applied specifically to the woollen known as *maerclaken*, defined by De Poerck (1951), III, no. 387, p. 85, simply as 'drap vendu au marché.' See also Boone (1990a), p. 136.

[47] Rijksarchief van Oost Vlaanderen te Gent, Oostenrijks Fond, layette 2: 'sur la requeste dediz foulons touchant le gouvernment de leur dit mestier avons ordonne ... que la chose demeure en tel estat comme elle est auparavant...' See also Boone (1990a), p. 136.

[48] Texts from Rijksarchief van Oost Vlaanderen te Gent, Raad van Vlaanderen, no. 7351, quoted and/or cited in Boone (1990a), pp. 136-37. I am greatly indebted to Dr. Boone.

during this era.[49]

Meanwhile, after considerable inflation, the restless fullers of Kortrijk were also agitating for a wage increase. But shortly after the Flemish coinage debasement of November 1428, their grievances were momentarily appeased, when the ducal officials, observing Philip the Good's earlier promise, if only partially, raised their wage from 36d to 44d *groot* per cloth, a 22.2 per cent nominal increase. Nevertheless, that new wage rate was still less than half the official value of the Flemish gold noble, now 8s 0d *groot* (96d), as established by that debasement.[50] Then, after a further and ruinous series of drastic debasements in his adjacent principalities of Namur and Brabant, Duke Philip abruptly reversed course and implemented a coinage *renforcement* in October 1433 - May 1434, one that also united the coinages and monetary systems of all his Burgundian territories in the Low Countries.

V. Wage Disputes with Monetary Reform and Deflation after 1433: the Flemish and Dutch Fullers' Guilds

Again promising the Estates not to alter the coinage, this time for twenty years, Philip issued a new silver *groot* or *groot vierlander* coinage for the Burgundian Lowlands, which was only 7.0 per cent stronger than his last Flemish coinage of November 1428, but 29.7 per cent stronger than his last, very heavily debased silver coinage struck in Namur. Striking an entirely new gold coin, the *Philippus,* more popularly called the *rijder* (*cavalier*), to displace the noble, the ducal government set the new bimetallic mint ratio at 10.87:1 (Table 8).[51] Though considerably lower than those mint ratios established by his recent Namur

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[49] Boone (1990a), pp. 136-37, noting that the Ghent fullers were quiescent during the revolt of 1449-53 against Philip the Good.

[50] See evidence from the ducal decrees and judgements of Nov. and Dec. 1433 and June 1434, in Algemeen Rijksarchief, Trésor de Flandre, Series I, nos. 1123-24 and 1127. For the monetary changes, see Munro (1973), Table J, p. 209.

[51] Munro (1973), pp. 100-02; Tables C, E-G, J-K, pp. 198-211; Munro (1984), Table 10, pp. 150-51; Spufford (1970), pp. 29-42. The new 1433 double groot, with 1.629 g pure silver (replacing the old coins in Brabant, Holland, and Hainaut as well by mid 1434) was, however, 5.6 per cent weaker than the double groot (1.725 g silver) of June 1418, when Philip had promised the Flemish Estates not to alter the coinage again for 15 years.

debasements, it was still somewhat higher than the previous Flemish ratio, set in November 1428 (10.75:1), and even higher than the current English mint ratio at London and Calais, now 10.33:1.[52]

That Burgundian coinage *renforcement* and the problem of gold-exchange rates provided the necessary and quite predictable circumstances for provoking yet another fullers' strike at Kortrijk in that very same year of 1433. The Kortrijk weaver-drapers, evidently anticipating that prices would fall with the new stronger coinage issues, had demanded that the fullers' wage increase of 1428 be rescinded: that their wage be restored to the 36d *groot* established by the January 1423 contract, and indeed also by the 1390 agreement. Since the Flemish price index was then 33 per cent higher than in 1423, the Kortrijk fullers understandably refused to bargain and literally walked out, deserting the town. On 17 November 1433, the bailiff of Kortrijk ordered the striking fullers to return to work at the stipulated wage of 36d *groot* per cloth. Needless to say, they did not.[53]

When the ducal officials then intervened to resolve this strike, the fullers were obdurate in their demands: a wage of one-half a gold noble per cloth, as clearly stipulated in the 1390 agreement, the 1419 ordinance, and implicitly promised by the duke's 1423 settlement (and partially granted in November 1428), should the coinage again be altered. Now the question became: which gold noble? The most important noble then circulating was the English coin, 10 per cent lighter than the ancestor that had provided the model for the Flemish counterfeits of 1388/90 (6.962 g vs. 7.735 g in pure gold). With *renforcement* (though with a more pro-gold ratio), the English noble was officially valued at 92d (7s 6d *groot*); and obviously 46d *groot*

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[52] Nevertheless, quotations for free gold rates on the Antwerp market (for various gold coinages) show an almost continuous rise from 1436; and by January 1443 both Philip and the Estates General were forced to recognize this market reality by prescribing a higher rate for the *rijder*, raising the bimetallic ratio to 11.32:1. From as early as October 1440 Philip had convoked meetings of the Estates to find solutions for the gold problem; and in January 1441, a petition from the nobility to increase the exchange rate on the Rhenish gold florin was rebuffed by the towns. In the next major change in the Burgundian coinage, in January 1454, with a new gold coinage, the bimetallic ratio was again raised, to 11.98:1. Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 2372; Van der Wee (1963), I, Table XVI, pp. 131-32 (Antwerp free gold rates); Spufford (1970), pp. 114-17; Munro (1973), pp. 134-35; 149-50; Munro (1984), Table 10, pp. 150-51.

[53] Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 1123.

would have been far too rich a wage for the Kortrijk drapers. Most of the 1428 Flemish nobles, 11.1 per cent lighter than the 1390 version (6.799 g vs. 7.649 g in pure gold), were being reminted into the new *rijder* coins; but those still circulating were officially valued -- in fact grossly undervalued -- at 88d *groot* (7s 4d) or 44d for half-nobles, which happened to be the very wage awarded in 1428.[54] Negotiations revealed, however, that the Kortrijk fullers would settle for less -- 42d. Even less, however, was what they received when Philip's councillors imposed a settlement, requiring the fullers to return to work at 39d *groot* per cloth. Indeed that was a settlement fully worthy of Solomon, for it was precisely half way between the amount demanded by the fullers and that offered by the drapers.[55]

Evidently the fullers appealed this decision directly to Duke Philip. On 28 June 1434, he dictated a revised agreement that proved to be a lasting one: a wage of 40d *groot* per broadcloth, the very same wage granted to the Ghent fullers in 1423.[56] The only further indications of industrial disputes involving Kortrijk fullers took place from May to August 1461; and that concerned not the wage itself but payment for *sticwerk* (small cloth pieces), in relation to full-sized cloths.[57] As Table 5 indicates, Kortrijk's fullers had benefited from the steep and prolonged deflation that ultimately followed the 1433-34 *renforcement*, though delayed from 1436 to 1440 by supply shocks from the Anglo-Burgundian war, disastrous disruptions to the wool trade, plague, famine, and -- not surprisingly -- civil strife.

In the quarter-century following the restoration of peace, the mean composite Flemish price index fell 32 per cent , again with a decline in all three of its major components: from 137.7 in 1435-9 to 93.9 in

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[54] See monetary data in Munro (1973), Tables C, E-F, and J-K, in pp. 198-210.

[55] Algemeen Rijksarchief, Trésor de Flandre, Series I, nos. 1123-24 (17 Nov. and 1 Dec. 1433).

[56] Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 1127. See also no. 1128, for 1 Oct. 1434, stipulating that the two journeymen (*cnapen*) be paid 15d groot each and the master, 'voor zine costen,' 10d groot. The wage agreement was to endure so long as the coinage remained unchanged, according to Duke Philip's promise to the Estates, for another twenty years.

[57] Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 1143 (14 August 1461): for *sticwerk* above 42 ells, 'dat zij daeraf betalen zullen dobbel ghelt van vollene...'

1460-64.[58] As shown in Table 5, the purchasing power of the Kortrijk fullers' new wage had thus risen by 47 per cent (from 15.94 units to 23.37) over this period. But, as Table 7 shows, the master building craftsmen in Bruges then fared even better, much better. Their daily money wages were not only unchanged by the 1434 *renforcement* but had in fact increased thereafter, from 10d to 12d *groot* by the late 1450s, so that their mean real wages had risen by 76 per cent over this same deflationary period (from 1435-9 to 1460-4).[59] That deflation was by no means unique to the Low Countries, and was just as pervasive and prolonged in England, even though her coinages had again remained unaltered, from 1412 to 1464.[60]

If such deflationary conditions fostered labour peace amongst the Flemish fullers, no such peace was to be found to the north, at Leiden, in Holland's major and still aggressively expanding drapery. Again, the Burgundian coinage *renforcement* and monetary unification, effected in Holland by May 1434, had led to a fullers' strike or *uutgaenc* -- literally 'walking out' of the town -- under circumstances almost identical to those at Kortrijk the previous year. The Leiden *gerecht*, the draper-dominated civic government in which no fullers served, soon succeeded in breaking this strike: in compelling the fullers to return to work, to swear never again to strike or to desert the town, on pain of imprisonment or exile, to accept a wage reduction from 56d to 46d *groot*, and to affirm that it was a 'reasonable wage' (*een redelic loon*).[61] But indeed so it was.

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[58] Munro (1984), Table B-5, pp. 110-4: the grain price index fell 43.1 per cent ; the dairy products index, 19.4 per cent ; industrial goods, 17.2 per cent ; and the composite price index, 31.8 per cent .

[59] From Stadsarchief van Brugge, Stadsrekeningen 1410/11 to 1459/10, wage payments in the *werken* accounts. See Table 7.

[60] From the 1435-39 peak to the 1475-79 trough, the English composite mean price level fell by 23.2 per cent : 113.5 to 87.2; and the grain component fell by 30.9 per cent , the meat/dairy, by 23.0 per cent ; and industrial goods, by 3.4 per cent (though dropping 8.7 per cent by 1450-54). This was really a continuation of the earlier deflation, despite the 1464 debasements. In both England and the Low Countries, aggregate mint outputs of gold and silver had fallen to their lowest levels of the 15th century. See Munro (1984), Tables B:1-7 and Graphs 1-13, pp. 96-122; and also Munro (1983), pp. 98-126, Tables 1-8, pp. 11-46; Spufford (1970), pp. 106-22; Day (1978), pp. 42-49; and Spufford (1986), chapter 15, 'The Bullion-Famines of the Later Middle Ages,' pp. 339-62, reaching 'its worst point in the early 1460s.'

[61] The Leiden fullers' wage had been raised to 56d groot in June 1432. Posthumus (1910), I, no. 111, p. 128; no. 122, pp. 137-8; no. 130, pp. 142-43 (11 March 1435). On the Leiden government and the drapers see Brand (1992), pp. 17-34.

Ironically, the new wage of 46d *groot*, already shown in Table 1, not only equalled but was specifically defined as a half English gold noble, precisely the wage for which the Kortrijk fullers had for so long striven! The subsequent story of the Leiden fullers' strikes, however, must await another study.[62]

VI: Industrial and Guild Organization in Flemish Textile Manufacturing: the Role of the Fullers and the structure of their wage payments

Who were these fullers, and why were they so prone to strike against the weavers? This is a crucial question virtually left unanswered in most studies of late-medieval Flemish social history but whose answer is requisite to complete this economic analysis. The fullers, an exclusively male occupation, constituted the only group of wage-earning textile artisans who enjoyed the protection of guild organization in late-medieval Flanders.[63] Their employers were the drapers, predominantly master-weavers, organized as the largest and most powerful of the four cloth guilds. These weaver-drapers were the true industrial entrepreneurs, who organized cloth production by a domestic putting-out system: distributing the wools for processing into yarns and then into cloth, hiring the wool-beaters, combers, carders, spinners, warpers, weaving assistants, and the fullers, paying them all piece-work cash wages.

The fullers, according to North America's leading historian of medieval Flanders, performed the 'least skilled of any of the large cloth-making occupations,' involving nothing more than 'stamping fulling earth into textiles to soften the prickly texture of raw wool;' and thus they were 'generally poor.'[64] The truth is, however, the exact opposite. In fact, they performed the final and very vital stage in the cloth-manufacturing process, which also commenced the finishing processes, and was thus crucial in determining both the durability and luxury-quality of the woollen broadcloths. Indeed, by the later Middle Ages,

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[62] The Leiden fullers struck again in 1447, 1455, 1470, and 1478: with full documentation in Posthumus (1910), I, nos. 187-90, 215, 279, 506-21, 529. For a fullers' strike at Mechelen in 1524-25, see Willemsen (1910).

[63] In most Flemish towns, so long as the fullers remained free to nominate or elect their guild officials (*dekenen*, *gezwornenen*), the journeymen usually had an equal say with the masters in that selection.

[64] Nicholas (1987), p. 155.

traditional foot-fulling had become a very complex process that required from three to five days' labour of a master fuller and two journeymen, depending upon the grade of cloth and season of the year, to process a standard-sized cloth, measuring about 33 yards (30.1 m) by 2.3 yards (2.1 m) from the loom. When removed from the loom, a true woollen was far too flimsy, fragile, and subject to damaging tears to be worn unfulled, because its yarns, spun from very fine, short-stapled, curly, serrated wool fibres, were too weak and delicate. These woollen yarns, however, especially the carded wefts, did have excellent felting properties; and the essential task of fulling was to exploit those properties.[65]

The fullers began by immersing the cloth in a large wooden or stoneware vat filled with warm water and fuller's earth (*floridin*, with hydrous silicates of aluminum, especially *kaolinite*), and then they thoroughly scrubbed and scoured it, section by section, to remove all the butter and starchy warp sizing that had been applied earlier to protect the delicate wools from damage and entanglement during the manufacturing processes. The fuller's earth, in fact, combined with the grease to form a cleansing soap. After rinsing the cloth and removing it from the vat, the fullers eliminated any knots (by 'burling'), regreased it with butter, and restored it to the fulling vat, along with fresh hot water, fullers' earth, and other chemicals (*Saponaria* or soapwort-root, urine, and *grummel* or oat-meal). Over the next several days, they vigorously stamped and trod upon the cloth, concluding with another scouring and rinsing. That combination of continuous treading, pounding, heat, moisture and chemicals compressed the warp and weft yarns tightly together and felted their scaly, curly wool fibres: i.e., forced them to contract, interlace, and mat together, reducing the total surface area by one half or more. Such compression, shrinkage, and felting gave the cloth far greater strength, homogeneity, durability, and density, thus explaining why it became so heavy; those processes also removed almost all visible signs of the weave and imparted a very soft texture or 'handle' to

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[65] True worsteds, in contrast, required little or no fulling: because their much longer-stapled, coarser, stronger, tightly twisted worsted yarns, warp and weft, produced a durable, fully manufactured cloth when woven. Mixed fabrics, with dry worsted warps and greased woollen wefts, did require some fulling, though much than for true woollens.

the cloth.[66] The fulled cloth was then hung to dry on a tentering frame, and tautly stretched by tenter-hooks on all four sides, to remove all wrinkles or creases from fulling and to ensure uniform length and width throughout the cloth; and while the cloth was drying, the fullers subjected it to further burling and a preliminary carding or raising with teasels, to complete the felting process.[67]

For this extremely arduous, time-consuming, yet highly skilled task the fullers were paid a wage unique in the textile industry: a combination piece work and time wage, since they were required to full a complete cloth within the three (or more) days specified in ordinances. For example, as Table 8 shows, the aforementioned Leiden ordinance of February 1435 stipulated that the master fuller and his two journeymen were to be paid 46d *groot* for a standard full broadcloth, or 15.33d daily (15d 8 mites).[68] In receiving 5.33d per day, the journeyman fuller was reasonably well paid for this era, earning 23 per cent more than a mason's day-labourer in Antwerp (4.33d *groot*) and 7 per cent more than a Bruges policeman or building labourer

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[66] For the Bruges *bellaert* of 1458, see documents in Delepierre and Willems (1842), pp. 42-43. After fulling, this broadcloth was reduced in area by 56 per cent , from 172 square ells to 75 square ells after fulling: in length, from 43 to 30 ells (from 30.1 m to 21.0 m; i.e., 32.9 yards to 23.0 yards); and in width from 4.0 to 2.5 ells (from 2.8 m -- unusually wide -- to 1.75 m; i.e., 3.1 yd to 1.9 yd). Late-medieval Flemish woollens weighed about 0.85 lb. per square ell, or 1.5 lb. per square yd, compared to the heaviest woollen overcoat today, about 0.65 lb. per sq ell or 1.12 lb. per square yd. See Espinas (1923), II, pp. 210-20, 729-32; De Poerck (1951), I, pp. 90-112; Munro (1988a), pp. 701-08.

[67] With *Dipsacus fullonum:* prickly heads of thistle-like plants packed together in a wooden frame. A far more intensive and thorough teaselling was subsequently and independently applied to the dry woollen cloth by the shearers or cloth finishers, who alternately 'dressed the cloth,' raised the nap, all the loose fibres, with the teasels, and then cropped those raised fibres with U-shaped, 18-inch long, razor sharp shears, which obliterated any remaining trace of weave left after fulling, and produced a texture almost as fine as silk. See n. 6 and De Poerck (1951), I, pp. 113-49.

[68] Prices taken from cloth purchases in: Gemeentearchief Leiden, Stadsrekeningen 1434-36. These woollens, half the length but the same width of those manufactured in the Flemish cities, and about half the length of an English broadcloth of assize, were made exclusively from upper ranking English wools: Middle Cotswolds, Holland and Kesteven wools of Lincolnshire, Rutland wools. Leiden's best woollens, the *puiklakenen,* were made exclusively from the finest English wools: Welsh 'March' wools of Herefordshire and Shropshire, and highest grade Cotswolds. See Posthumus (1910), I, no. 132, i.15 and ii.16.3 (1436), pp. 147-50; and no. 132.iii.28 (1442), p. 156. On such wools, see Munro (1978), pp. 118-69. The Leiden civic ordinance of 18 Feb. 1435 (Table 1) specified a wage of 2/3 a gold noble or 61.33d groot for *puik half laken*, or 122.67d (10s 2.67d) for a full *puiklaken*, on the condition that it be fulled for four days.

(5d *groot*) during the mid 1430s.[69] As might be expected, those Leiden fullers earned 20 per cent less than master masons, carpenters, and their free journeymen in Antwerp (6.67d *groot*) and, more surprisingly, 47 per cent less than master masons and carpenters in Bruges (10d *groot* per day). Wages in Bruges, however, were well above the average for the Low Countries, reflecting that city's pre-eminent commercial and financial role, its consequent wealth, and high cost of living.[70]

This table suggests that the journeymen fullers earned a higher daily wage than did their masters at Leiden (4.67d *groot*); but that is illusory, because the master-fullers, though wage-earners, were also themselves industrial entrepreneurs, who usually operated up to four fulling vats, employing two journeymen per vat.[71] The Leiden master-fuller operating four vats would have earned a daily wage substantially higher, 87 per cent higher, than that paid the relatively affluent Bruges master mason or carpenter (i.e., 18.67d vs. 10d *groot* daily). At the same time, however, his own so-called wage (*loen*) also included compensation for his capital, materials, and a residual profit for his enterprise.[72]

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[69] Bruges wages from Stadsarchief Brugge, Stadsrekeningen 1434-35, 'werken' accounts; for Antwerp, from Van der Wee (1963), I, pp. Appendices 27-30, Table 1, p. 458 (1d groot Flemish = 1.5d Brabant). The Bruges policemen, however, earned this 5d daily wage for all 365 days in the year, while fullers and building craftsmen could probably count on no more than 210 - 240 paid days a year. The Leiden fullers' daily wage is calculated on the assumption that it was for three days' work only, not including supplementary tasks by these fullers. Their wage was about 15 per cent higher than the current wages for fullers at Ghent and Kortrijk, who evidently then earned 40d groot per cloth for the same combination of fullers. See pp. xx and nn. 76, 86 below.

[70] See n. 9; and also Sosson (1977), pp. 225-60 (which also includes wage tables).

[71] Leiden drapery *keure* amendment of 26 February 1435 by the civic government: 'dat nyement binnen Leyden meer houden en sel dan vier gespan binnen siinen huyse off dairbuten noch oec geen overspan wercken,' in Posthumus (1910), I, no. 74:118:1, p. 92. See also complaints of the fullers in April 1443: 'dat sy niet meer dan vier commen houden.' *Ibid*, I, no. 154, pp. 179-80. Similarly, the Wervik fullers' *keure* of October 1397 specified 'dat elc meester mach setten iiii [4] commen ende niet meer ketele...' De Sagher (1951-66), III, n. 554:176, p. 472. The Wervik master fuller, however, in contrast to his Leiden counterpart, received a much smaller proportion of the current wage, then 35d per broadcloth (within three days): 14d for each of the two journeymen and only 7d groot for the master.

[72] The same was true of the wages paid to many master craftsmen in the building trades, who were also, similarly, entrepreneurs earning ancillary incomes from related commercial and industrial occupations, especially in supplying inputs for their crafts. No evidence has been supplied, however, to show that any artisans of this era, masters or journeymen, in the Low Countries or England, ever received their actual wages

If the master fuller's cash wage was a relatively substantial one, the cost of fulling a full-sized woollen broadcloth also represented a significant proportion of the weaver-draper's value-added manufacturing costs: about 20 per cent (based on this Leiden example), not including the fuller's share of finishing costs in tentering and teaselling.[73] The wool preparation accounted for about 4 per cent , combing and carding together for 12 per cent , spinning for 40 per cent , and weaving itself for the final 24 per cent of pre-finishing production costs.[74] The weaver-drapers evidently had little problem in controlling wages for these processes, especially if they acted as a collective monopsony in hiring yarn-producers, warpers, and weaving-assistants. Most of the yarn-producers, accounting for well over half the costs, were almost entirely

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in anything but cash. The best documented evidence comes from the 15th-century Leiden drapery, whose official *keuren* or ordinances consistently required the masters to receive payment from the drapers in cash only (allowing no credit) and to pay journeymen their wages weekly, on Saturdays, in silver coin, forbidding any payments 'in truck.' See Posthumus (1910), I, no. 74.111-113, pp. 90-91 (Mar. 1415); no. 132.vi.9 (1436/37); no. 508:10-13, pp. 621-22: 'ende die meester sal gehouden wesen sijn volle gelt te nemen van elc laken ...dat die drapenieres hoir volres hoir volle loen geven sullen, ende alle Saterdages hoir gelt geven sullen, sonder horen volres enigerhande drinck te vercopen...' [nor: 'bier, broot, sout, kairssen, seep, butter noch kase.'] (Nov. 1478); no. 525:25, pp. 653-56 (Dec. 1478). As frequent complaints from journeymen fullers in Leiden attest, many master-fullers continued to earn income from selling beer and bread: 'soe en moet gheen meester volre bier tappen;' in *Ibid.*, no. 525:20, p. 653. One remnant of former payments in kind was the periodic 'drinckgelt,' usually specified as 2d in current coin. For England, my conclusions are drawn from examining the wage payments by the various London guildhouses during the 15th century, in the Guildhall Manuscripts Library; and those in the London Bridge Master's Account Rolls, and Weekly Payment Books, from 1381/2 to 1509, located in the Corporation of London Record Office.

[73] This percentage is calculated by combining similar data for cloth production at Leiden and Leuven in 1434-35. At Leuven the total cost of producing a fully finished woollen cloth, 30 ells by 9 quarters, made from English Staple wools (probably Lincolnshire) was £4.953 groot Flemish: £3.094 for the wool (62.5 per cent), £0.892 for dyeing and dressing (18.0 per cent); and £0.967 -- 232d groot -- for the other value-added manufacturing costs (19.5 per cent) Stadsarchief Leuven, Stadsrekeningen 1434-35, nos. 5058, fo. 34r.; see also Munro (1977), Table 13.2, p. 256. At Leiden, the price for two finished *voirwollen halvelaken* was almost the same, £4.900 groot Flemish. If total value-added manufacturing costs, apart from dyeing and finishing, were the same, then 19.52 per cent of £4.900 = £0.9566 = 230d groot; and 46d/230d = 20.0 per cent. Or, conversely, if the cost of fulling was the same at Leuven: then 46d/232d = 19.8 per cent .

[74] Calculated from data extrapolated from production costs at the Medici woollen workshops in the 1550s, producing similar woollens with similar techniques: in De Roover (1941), pp. 32-33; and from Endrei (1990), pp. 14-23, where he estimates production hours in producing a 15th-century Flemish woollen as follows: 622 hours for carding/combing/spinning (60 per cent), 130 hours for weaving (13 per cent), 281 hours for finishing (27 per cent , with an estimate of 150 hours for foot-fulling -- which may be too high). See the next note.

defenceless females -- supplementary-household, largely rural labour. The weaver-drapers, however, could exercise no such unbridled power over fulling costs, which may have often determined the difference between profit and loss in their individual draperies. As entrepreneurs, the weaver-drapers derived their net incomes from profits alone (apart from any other occupations in which they engaged). Because they were so dependent upon the merchants who sold them the wools, purchased the manufactured cloths, and supplied them with credit and cash advances, including merchant-bankers, their profit margins in this industry were usually very meagre, especially with its precipitous decline from the 1360s.[75]

Furthermore the weaver-drapers suffered from a potentially numerical disadvantage in bargaining with the fullers' guilds. For a master-fuller and two journeymen could process between 45 and 80 standard woollens a year (i.e., 15 - 27 per fuller), while a master weaver and his assistant could together weave only about 20 - 25 broadcloths a year.[76] Thus the Flemish cloth industry required fewer fullers than weavers,

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[75] See especially Espinas (1923), II, pp. 603-06, 824-32; Van Werveke (1946a), pp. 5-26; and also Van Werveke (1931), pp. 1-15; Van Werveke (1949b), pp. 115-27; Van Werveke (1951a), pp. 37-51; Van Werveke (1954), pp. 237-45; and, for banking and the drapers, see especially Murray (1990), pp. 24-31. For the decline, see Munro (1979), pp. 110-22; Table 1, p. 138; Table 12, p. 151; Nicholas (1987), pp. 135-44.

[76] For woollen-weaving, see De Sagher (1951-66), II, no. 279, pp. 323-24, for Haubourdin (Flanders) in April 1593: two weavers operating one loom, and employing 27 persons, took 6 to 7 days to weave a cloth of 18-20 ells; and thus 13-14 days for a full cloth of 36-40 ells on the loom, with another 10-12 days for wool preparation and spinning, and 6-7 days for finishing. Endrei (n. 14) also estimates that two weavers on a broadloom took about 12-13 days or about 130 hours to produce a cloth of 42 ells by 3 ells, thus producing about 20 cloths in a 240-day year, or 10 cloths per weaver. Fulling such woollens itself (apart from other aspects of cloth-processing by master-fullers) required from 3 to 5 days: and thus from 80 to 48 woollens in a 240-day work-year (26.7 to 16 cloths per fuller). But a master-fuller operating two to four vats obviously did not occupy himself full-time at any one vat. Many weaver-drapers also controlled several looms, though presumably worked at only one of them, or none at all, hiring other weavers. See Van Uytven (1981), pp. 283-94, who suggest a maximum output of 42 cloths per loom (i.e., 21 per weaver), an improbably high estimate; and he also estimates an output of 34.3 woollens per fuller per year: 240 days per year/3.5 days per cloth/2 journeymen fullers. Munro (1988a), pp. 693-711; Endrei (1990), pp.17-22; and also Endrei (1968), pp. 110-26; Endrei (1971), pp. 1291-99; Endrei (1981), pp. 253-62; Endrei (1983), pp. 108-19. Production processes remained basically the same in the 18th century. According to an English Parliamentary commission report of the 1780s, two men and a boy (as weft-reeler) weaving a superfine broadcloth of 34 yards, with 70 lb. of wool, required 364 man-hours (= 14.5 days); and another 888 man-hours were spent in wool preparation, spinning, weft-reeling, and warping. Lipson (1921), Appendix I, pp. 256-60. See also Mann (1971), pp. 316-28, for 18th-century cloth-production costs.

certainly fewer master fullers, in a guild ratio estimated at 6.5:10;[77] and most master-fullers worked for two weaver-drapers, who often found themselves competing for their services. Those circumstances and prolonged industrial decline help to explain why the weavers' guilds struggled with the other textile guilds, to gain increased power with the fourteenth-century town governments, especially, as Hans Van Werveke had argued, to impose urban wage controls on the cloth industry, above all the fullers. In any industrial strikes or other strife with the fullers, so frequent from the 1340s through to the 1380s, the weavers were obviously going to enjoy a numerical advantage in their armed militias.[78]

The weaver-drapers only rarely came into conflict with the other two (or three), very small guilds of cloth-finishers, the dyers and shearers, because the drapers seldom employed them directly. These cloth-finishers were, instead, fully professional artisan-entrepreneurs whose functions were far more commercial than industrial. They worked for a wide variety of clients, chiefly merchants, earning professional fees, which, though town-authorized, were usually determined by their own guilds.

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[77] The Bruges militia records for the siege of Tournai in 1340 indicate 1,016 weavers, 669 fullers, 360 shearers and 123 dyers (in a militia of 7,234 men, within a population of ca. 35,000): Van Houtte (1967), pp. 40-42. Those for Ghent: 1,800 weavers, 1,200 fullers, and 2,139 from the 'small crafts'. Espinas-Pirenne (1906-24), II, p. 614. For the 1356-58 musters in Ghent, with a population of ca. 60,000, Nicholas (1987), Table 2.1, p. 19, provides estimates of 3,539 weavers (26.4 per cent), 2,359 fullers (17.6 per cent), 1,590 other textile artisans (11.9 per cent), and 5,895 for the 'small guilds' (44.1 per cent). See also Prevenier (1975), pp. 269-303. A Flemish weaver usually employed from six to eight spinners and the same number of warp-combers and weft-carders.

[78] See Pirenne (1915/1963), pp. 142-200; Nowe (1945); Van Werveke (1931), pp. 7-15; Van Werveke (1946b), pp. 48-69; Van Werveke (1949b), pp. 115-27; Van Werveke (1951b), pp. 363-67; Wyffels (1951); Verbruggen (1952); Nicholas (1987), pp. 1-16, 130-34, 154-77; Nicholas (1990), pp. 235-62; Munro (1990), pp. 41-52. The earliest recorded industrial strike (with the Flemish term *takehan* -- 'to take the hands') took place at the then leading drapery town of Douai, in January 1245 (ns): 'On fait le ban ke nus ne soit si hardis en toute ceste vile ... ki face takehan, et kicunques le feroit, il kieroit el fourfait de lx lb. et seroit banis ung an de le vile.' Espinas-Pirenne (1906-24), II, no. 218, p. 22. Certainly the most famous weaver-fuller conflict over wages took place at Ghent, on 2 May 1345, known as *Kwaeden Maendach*, 'Evil Monday.' According to the *Chronicon Comitum Flandrensium*, 'the fullers wanted to have another four groot [4d] per cloth; but the weavers and drapers would in no way agree, fought against them, and triumphed over them,' killing supposedly hundreds of fullers, including their guild dean (*deken)* Jan De Bake. In De Smet (1837), I, pp. 214-15: 'Volebant enim fullones habere de quolibet panno quatuor grootsos plus quam habere solabant.' See also Espinas-Pirenne (1906-24), II, pp. 615-17; Lucas (1929), pp. 526-18; Van Werveke (1943), pp. 89-94; Nicholas (1987), pp. 1-10, 154-63.

VII: Responses of the Flemish Weaver-Draper Entrepreneurs: Why did they not mechanize fulling?

If, therefore, the weaver-drapers' so frequently found the fullers to be the chief obstacles and threat to their profitability, and if their industrial disputes so often disrupted their production, why did they not displace these troublesome fullers with machines, i.e., with water-powered fulling mills? Documented in Italy from the late tenth century, fulling mills had spread throughout much of north-west Europe from the twelfth and thirteenth centuries.[79] Such mills could reduce the fulling process and costs from three days with two or more fullers to about nine hours for some smaller cloths or, for a full-sized broadcloth, to a single-day, often with just one operator.[80] Quite explicit Florentine data for producing similar quality woollen broadcloths indicate that mechanical fulling and tentering together accounted there for only 5 per cent of such value-added manufacturing costs -- i.e., a saving of 75 per cent over traditional foot-fulling; and independent calculations for fulling-mills in sixteenth-century Brabant similarly indicate cost-savings of 70 per cent or more.[81] Furthermore, the renowned Prof. E.M. Carus-Wilson long ago argued that water-powered fulling mills, which had come to dominate the English cloth industry by the later fourteenth century, gave the English their most powerful advantage in ultimately vanquishing the Flemish cloth industry.[82]

Carus-Wilson herself long ago provided the classic explanation for the supposed lack of fulling-mills in the medieval Low Countries, by observing that 'Flanders like Lincolnshire is a land of windmills, not

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[79] Malinama (1986), pp. 115-28.

[80] Mann (1971), pp. 295-96, states that the duration of mechanical fulling varied from 9 to 36 hours, depending on the cloth dimensions and weight -- about 24 hours for a full standard white broadcloth.

[81] Raymond De Roover (1941/1974), pp. 116-18: in the production of 71 woollen broadcloths in the Medici drapery (1556-58), fulling and tentering cost 70 fl. 1s 0d, while total pre-finishing labour manufacturing costs were 1,381 fl. 17s 4d. As a proportion of the total price (43.33 florins), fulling amounted to 2.3 per cent . For Brabant, see Van Uytven (1971), p. 10.

[82] Carus-Wilson (1941/1954), pp. 183-210, and Carus-Wilson (1952), pp. 409-14 (revised edn. 1987, pp. 669-90). Comparable English cost data are, however, inadequate for this period. For the thirteenth century, see Lloyd (1968-70), pp. 335-36, indicating fulling costs ranging from 3.70s to 4.11s per cloth, but without indicating the form of fulling or total production costs per cloth, nor their size. Britnell (1986), pp. 61-2 also provides cloth manufacturing cost data for 14th-century Colchester, with about the same fulling costs, but without specifying the type of fulling (or whether it also included finishing).

water-mills'.[83] In fact, however, much of the Low Countries, rural and urban, including all the Flemish drapery towns, had long used water mills for grain-grinding and some industrial purposes (including paper-making);[84] and in the thirteenth and early fourteenth centuries, some districts in Brabant and Namur had also utilized fulling mills themselves.[85] Certainly the Leuven drapery had done so, though evidently not the Flemish drapery towns of Bruges, Ypres, and Ghent, possibly because fulling-mills on their slow moving rivers would have required the more costly overshot-wheels and millraces, and because their then densely populated towns would have imposed too high an opportunity cost. But in the later fourteenth and fifteenth centuries, severe population declines should have favoured fulling-mills, even in Flanders, by reducing the relative costs of land sites while presumably raising the real cost of labour.[86] Furthermore, many of the late-medieval English urban draperies, including Bristol, Salisbury, London, Leicester, Worcester, and those in the East Anglian lowland towns, with equally slow-moving rivers, did utilize fulling-mills with overshot-wheels, either within or just outside town-walls, with apparently substantial if reduced cost advantages over

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[83] Carus-Wilson (1952), p. 413; modified in the 2nd edn. (1987), p. 674, to read: 'is on the whole a land of windmills...,' in response to Van Uytven (1971).

[84] Examples of water mills in: (a) Bruges: Stadsarchief Brugge, Stadsrekening 1291-92, passim: 'ad molendinum ad aquam'; Stadsrekening 1351-52, fo. 70-2ro: 'ter Watermuelene ten Wijgaerde'; also published in: Wyffels and Smet, *De Rekeningen van de stad Brugge (1280-1319)*, vol. 1; (b) Ghent: Stadsarchief Ghent, Stadsrekening 1333-34, reeks n. 400:3(5), fo. 140ro: 'vanden neue watermolne ter Braembruggen boven den Temerkerke; account published in Vuylsteke, *Gentsche Stads- en Baljuwsrekeningen,* p. 910; (c) Ypres: Des Marez-De Sagher (1909-13) vol. I, no. 21, p. 294 [1309-10]: 'des moulins a ewe'; n. 36, pp. 426-27 [1324-25]: 'des molins à yauwe à le porte de Messines'; Algemeen Rijksarchief België, Rekenkamer, reg. no. 38,635: Stadsrekening, July - Sept. 1406, fo. 2ro.: receipts from the 'watermuelen ter Meesenpoorte', £35 10s 0d *parisis*; (d) Mechelen: Algemeen Rijksarchief, Rekenkamer, reg. no. 41,205, fo. 32r: (Mechelen stadsrekening for 1372): 'van metsene [masons] aent molenhuys ... ane de watermolne, van witte stene..;' (e) Kortrijk: Algemeen Rijksarchief, Trésor de Flandre, Series I, no. 1114 (July 1409): 'eenen molen ... ligghende by der stede van Curterike.' For Ghent water-mills, see also Boone (1990b), pp. 183-85.

[85] Van Uytven (1971), pp. 2-4: in Brabant, Namur, Maastricht, and also Artois (n. 19); but none has been found for Flanders itself.

[86] See Blockmans (1980), pp. 833-63; Nicholas (1987), pp. 17-40; and see above n. 35. The agrarian recession, especially marked in grain farming, evidently encouraged the conversion of many water-powered grain mills to fulling mills. Graph 2 suggests, however, that real labour costs were not rising in Flanders until the 1390s.

foot-fulling.[87]

If Carus-Wilson was evidently mistaken in believing that mechanized fulling had been forbidden in the English cloth towns, for fear of causing technological unemployment, perhaps she had stronger grounds for contending that, in Flanders, fulling mills 'had been prohibited by the urban gilds, which were not less conservative than those of England, and very much more powerful.'[88] Such a supposed ban seems logically inconsistent with her primary argument; but, in any event, no such Flemish bans were ever issued, and this seductive, plausible argument ignores the historical realities of fourteenth-century Flanders. For, quite clearly as abundant scholarship on fourteenth-century has fully demonstrated, the Flemish fullers' guilds never possessed the independent power to prevent mechanized fulling, had the other guilds and cloth-merchants ever believed that it would benefit their industry; nor did the late-medieval Brabantine and Dutch fullers exercise any more power.[89]

In fact, however, the Brabantine draperies had much earlier forsaken their fulling mills, by the very early fourteenth century; so did the Norman cloth industry during that century, reserving a very few such mills only for '*les gros draps bureaux, de grosses et mauvaises laynes.*'[90] The few fulling mills to be found in very minor *petites draperies* of Artois (Hesdin, St. Pol, Aire) and the Meuse Valley region (Huy, Liège,

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[87] See in particular, for East Anglia, Britnell (1986), pp. 13-21, 76-78; and Gervers (1989), pp. 48-49, 69. For Bristol, fullers' ordinances published in Bickley (1900), II, pp. 10-12 (1346), 15-16 (1381), 75-79 (1406); for Worcester, *Statutes of the Realm*, III, pp. 459-60 (25 Hen VIII c. 18, 1533-34); for Wiltshire, including the major town of Salisbury, see Ramsay (1965), pp. 18-20. For London: Riley (1859-62), I, pp. 127-28 (1298); Sharpe (1899-1912): *Letter Book C*, pp. 51-2 (1298); pp. 52-53 (1314); *Letter Book D*, pp. 239-40 (1311); *Letter Book H*, p. 37, 47-48 (1376): London cloths to be fulled at Stratford mills only by those who own them.

[88] Carus-Wilson (1952), p. 413.

[89] It might be argued that with fourteenth-century Flemish industrial organisation individual weaver-drapers, or master fullers or finishers, lacked the capital or access to the capital necessary to build fulling-mills. But if these drapery towns could themselves build and operate or lease out water-mills for flour-milling and other purposes, they could have adapted them to fulling and similarly leased them to the industry.

[90] Mollat (1976), pp. 415-18.

Verviers, Maastricht) evidently also produced only cheap fabrics for local or regional consumption.[91] That development happens to coincide with a major structural shift in the traditional Flemish and Brabantine cloth-manufacturing industries: a reorientation towards or greater concentration upon the production of luxury woollens, in face of steeply rising transaction costs in international trade, which had rendered exports of cheaper textiles unprofitable. The principal cause, commencing in the 1290s, was widespread and chronic warfare in Italy and the Mediterranean basin, which had previously constituted by far the major markets for cheap textile exports from the Low Countries.[92]

That industrial re-orientation towards luxury woollens, which, as noted earlier, mandated the exclusive use of English wools, thus preceded the rise of English competition.[93] If the increasingly heavy taxation of English wool exports, especially from the 1360s, then gave the English industry a decided cost advantage, the form of that wool-taxation, in *specific* rather than *ad valorem* duties, led to another re-orientation in the Low Countries' textile industries.[94] Their tax burdens were relatively lighter if they purchased only the very best and most costly English wools, from the Herefordshire and Shropshire Marches, the Cotswolds, and Lincolnshire, and thus concentrated upon just the very narrow upper-luxury range of the now seriously contracting European markets, while leaving the lower ranges to the English and other competitors.[95]

Under such circumstances, fulling-mills could not possibly have assisted, let alone rescued, their cloth industries. In the first place, both the traditional urban draperies and the rising *nouvelles draperies*,

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[91] Van Uytven (1971), pp. 4-6; Espinas-Pirenne (1906-1924), I, n. 10, pp. 28-33 and n. 13, pp. 36-37 (Aire: 1358); II, n. 582, p. 689-90 (Hesdin: 1340); III, n. 706, p. 336 (St-Pol: 1383); IV, n. 938, pp. 69-70 (Hesdin: 1379).

[92] See Munro (1991a), pp. 110-48.

[93] See above p. and See Munro (1978), pp. 118-69; Munro (1979), pp. 110-22; Munro (1983b), pp. 235-50; and Munro (1991a), pp. 110-48.

[94] See n. 12 above.

[95] See nn. 35, 109 above.

undergoing the very same transformation, believed that the heavy oaken hammers of mechanical fulling, pounding the cloth 30-40 times a minute, impaired these very fine English wools and thus the luxury quality of their broadcloths.[96] Secondly, since the Flemish *drie steden* (Bruges, Ypres, Ghent) were necessarily selling their woollens at double the price of more of English broadcloths,[97] their conversion to mechanized-fulling would have permitted only a very minimal reduction in the wholesale price, 3 per cent or less, gaining them few if any new customers, while risking the loss of far many more by undermining their reputation for the highest quality woollens.[98]

The more aggressive and successful *nouvelles draperies*, by marketing generally lower-priced woollens, and gaining remarkable success in the Mediterranean basin,[99] presumably would have derived a relatively greater advantage from mechanized fulling, especially with access to cheaper sites on the faster-flowing Lys river. But woollens from the leading *nouvelles draperies* -- Kortrijk, Wervik, and Menen -- were still about 50 per cent more expensive than comparable English broadcloths, and some were just as costly

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[96] See Munro (1988a), pp. 705-11; Mollat (1976), p. 418; Van Uytven (1971), pp. 5-6; Weckerlin (1905), pp. 34-35; Hall-Russell (1981), pp. 113-19; Scott (1931-32), pp. 30-52; Mann (1971), pp. 293-99, stating (p. 296) that 'cloths could easily be damaged in [mechanical] fulling.'

0. For fourteenth century cloth prices, see Tables 2, 4. For the 15th century, comparing English and Flemish prices, see Tables 13.2 - 13.5 in Munro (1977), pp. 257-67; and Munro (1983), Tables 3.5 -3.11, pp. 40-51; Munro (1991a), Appendix 4.1, pp. 143-48. In the 1430s, an Ypres black broadcloth and a Ghent *dickedinnen* broadcloth sold for £7.000 groot Flemish = £6.341 sterling, and a Bruges black broadcloth, for £8.000 groot = £7.247 sterling, while the mean value of comparably sized English broadcloths purchased for the royal wardrobe in 1438-39 was £2.545 sterling; and the mean export value in the 1430s was £2.655 (£2.494 in the 1440s).

[98] See Table 4. The 46d groot cost in fulling two *voirwollen halvelakenen* of Leiden represented 20 per cent of the value-added manufacturing costs but only 4.3 per cent of the wholesale price (Table 6); and a cost-savings of 75 per cent from mechanized fulling would thus represent only 3.23 per cent of that price. In the mid-1430s a Ghent *dickedinnen* broadcloth was priced at £7 0s 0d groot; and if its rate for fulling had remained the same in 1435, and was the same for *dickedinnen* as for fulling *maerclakenen,* at 40d per cloth, that would have represented just 2.73 per cent of the wholesale price; a 75 per cent cost-savings, just 2.0 per cent .

[99] See n. 23 above.

as those from the Flemish *drie steden*.[100] Indeed, striving to emulate their luxury-quality woollens, the *nouvelles draperies* of this era steadfastly maintained traditional foot-fulling, at least until the sixteenth century,[101] when international economic conditions again favoured export-oriented production of cheaper woollens and semi-worsteds in the Low Countries. By the mid sixteenth-century, fulling-mills were again spreading, quite rapidly, throughout the Low Countries: first and foremost in the so-called *nouvelles draperies* of the Lys Valley, now led by Armentières, which collectively had become Flanders' major cloth industry; and also in Bruges, Ypres, Amiens, Brussels, Leuven, Mechelen, the Norman towns, and finally also (by 1585) at Leiden.[102]

[100] In the 1430s, prices for Wervik woollens sold at Bruges ranged from £3.083 to £3.900 to £5.750 groot (= £2.792 to £5.209 sterling); Kortrijk woollens, from £3.083 to £3.500 groot (= £2.793 to £3.170 sterling); Menen woollens, from £4.600 to £6.000 groot (= £4.157 to £5.435 sterling). Munro (1977), pp. 263-64, Table 13.3.

[101] For similar reasons, the leading *nouvelles draperies* were reluctant to give up English wools when they became far too expensive and switch to much cheaper, though good quality Spanish *merino* wools. In the 1450s, the Wervik drapery required its members yearly to swear an oath to use none but English wools. De Sagher (1951-66), III, no. 577, pp. 520-1 (1458); nos. 581-4, pp. 527-31 (1463).

[102] Van Uytven (1968), pp. 61-76; Van Uytven (1971), pp. 1-14; and in the Norman towns: Mollat (1976), pp. 403-21; see also Munro (1988), pp. 705-11. For fulling mills in Brussels: Stadsarchief Brussel, no. 1436, fo. 48-9ro (June 1535); in Leuven: Stadsarchief Leuven, no. 718, fo. 27ro (October 1556); in Ypres: Diegerick (1853-60), V, no. 1664, pp. 254-56 (March 1543); at Armentières: De Sagher (1951-66), I, no. 100, p. 316 (June 1562) and no. 101, pp. 322-23 (August 1564); and for Leiden, Posthumus (1911), III, no. 158, p. 183 (August 1590).

Table 1. **The Structure of Fullers' Wages at Leiden, February 1435:**

For Fulling Two Voirwollen Halvelaken (Half-Cloths), Priced at £4 9s 0d groot Flemish: from 21 ells by 13 quarter-ells each (14.7 m by 2.28 m) to 16 ells by 8 quarter-ells (2 x 11.2 m by 1.4 m) in three days

Wages in d(eniers) groot Flemish

Artisan	**Piece Work Wage**	**Percent**	**Daily Wage in d groot**
Master Fuller	14d	30.43%	4.67d
1st Journeyman	16d	34.78%	5.33d
2nd Journeyman	16d	34.78%	5.33d
TOTAL WAGE (= one-half gold English noble at 92d groot Flem.)	46d	100.0%	15.33d

Source: Nicolaas Posthumus, *Bronnen tot de geschiedenis van de leidsche textielnijverheid, 1333 - 1795*, Vol. I: *De middeleeuwen* (The Hague, 1910), nos. 121, 124, pp. 136-39.

Table 2. **Prices of Ghent's Woollen Cloths:**
Dickedinnen* Broadcloths and Small Cloths
in Pond Groot (Livres Gros) and Florentine Florins:

1340 - 1412

Year	Dicke-dinnen Broad-cloth in £ groot	Dicke-dinnen Broad-cloth in Florins	Dicke-dinnen Small-cloth in £ groot	Dicke-dinnen Small-cloth in Florins	Exchange Rate of the Florin in d groot	Grams of Silver in the Flem. d groot
1340	2.350	37.6	1.150	18.4	15.000	2.908
1349	2.613	37.3	1.363	19.4	16.833	2.067
1353			1.704	21.4	19.083	1.835
1354			1.979	23.7	20.000	1.747
1361	4.958	54.1	2.583	28.2	22.000	1.629
1367	5.163	50.4	2.796	27.3	24.583	1.372
1369	5.592	49.0	3.225	28.2	27.416	1.229
1370	5.913	44.3	3.333	25.0	32.000	1.173
1377	6.000	45.0	3.550	26.6	[32.000]	1.114
1378	7.600	57.0	3.667	27.5	[32.000]	1.114
1380	7.500	56.3	4.000	30.0	[32.000]	1.011
1382	7.500	56.3	4.000	30.0	[32.000]	1.011
1389					42.500	0.781
1390	5.958	45.4			31.500	1.018
1391	5.538	42.2			31.500	1.008
1402	5.667	41.2			33.000	1.018
1403	6.000	43.6			33.000	1.018
1412	5.700	41.5			33.000	1.182

***** *dickedinnen* broadcloths purchased annually for the aldermen (*schepenen)* and *dickedinnen* smallcloths purchased for the civic clerks (*clerken).*

Table 3. Wage Disputes in the Flemish Cloth Industry: Fullers vs. Weavers, at Ghent, Ypres, Kortrijk, Wervik, and Dendermonde, 1340 - 1461

A: fullers' wage dispute

B: fullers' wage dispute leading to a strike and/or desertion of the town

Year	Ghent	Ypres	Kortrijk	Dender-monde	Wervik
1340		A: Jan.	B: Jan.	A: (in ?)	
1341		A: May			
1343		A:	A:		
1345	B: May Kwaeden Maendag		A:		
1355				A: Sept	
1364				A: June	
1367				B: June	
1373-1374	B: Sept		A:		
1379	B: July				
1381	A: Oct				
1386	A: Jan				
1390			A: Aug (or B)		
1392					A:
1419			A:		
1422			B: Apr		
1423	B: May		B: Nov.		
1427	B: July				
1428	B:		A:		
1433			B: Nov.		
1461			A: August		

Table 4. The Purchasing Power of Fullers' Wages at Ghent, 1370-4 to 1435-9: The Wage for a Master and Two Journeymen Fullers for Fulling a Cloth Within Three Days:

in deniers groot Flemish and in units of a Basket of Consumables, in Quinquennial Means (5 Years)

Five-Year Period of the Mean	Fullers' Wage in d. groot Flemish.	Price of a Basket of Consumables in d. groot Fl.	Annual Wage in Units of this Basket (210/3 days)
1375-79	45.0	148.13	21.27
1380-84	45.0	143.46	21.96
1385-89	45.0	161.29	19.53
1390-94	32.0	125.72	17.82
1395-99	32.0	112.36	19.94
1400-04	32.0	112.65	19.89
1405-09	32.0	125.97	17.78
1410-14	32.0	121.17	18.49
1415-19	32.0	138.56	16.16
1420-24	34.4*	135.95	17.71
1425-29	40.0	149.43	18.74
1430-34	40.0	163.72	17.10

* Raised from 32d to 40d in May 1423.

Composition of the Flemish Basket of Consumables:

Commodity	Mean Value in 1450-54	Weight in this Index	Weight in the Phelps-Brown Index (England)
45.46 litres of wheat 39.37 litres of rye 18.18 litres of barley 24.37 litres of peas 163.66 litres of barley malt			
Subtotal	57.19d	44.8%	42.5%
13.61 kg of butter 13.61 kg of cheese			
Subtotal	44.76d	35.1%	37.5%
1.225 metres of coarse woollens			
Subtotal	25.63d	20.1%	20.0%
TOTAL	127.58d	100.0%	100.0%

Table 5. The Purchasing Power of Fullers' Wages at Kortrijk, from 1375-9 to 1435-9: The Wage for a Master and Two Journeymen Fullers for Fulling a Cloth In Three Days: in deniers groot Flemish and in units of a Basket of Consumables In Quinquennial Means (5 Years)

Five-Year Period of the Mean	Fullers' Wage in d. groot Flemish.	Price of a Basket of Consumables in d. groot Fl.	Annual Wage in Units of this Basket (210/3 days)
1375-79	41.0	148.13	19.38
1380-84	41.0	143.46	20.01
1385-89	41.0	161.29	17.79
1390-94	36.0	125.72	20.05
1395-99	36.0	112.36	22.43
1400-04	36.0	112.65	22.37
1405-09	36.0	125.97	20.01
1410-14	36.0	121.17	20.80
1415-19	36.0	138.56	18.19
1420-24	36.0	135.95	18.54
1425-29	37.6 *	149.43	17.61
1430-34	43.0 **	163.72	18.38
1435-39	40.0	175.70	15.94
1440-44	40.0	153.83	18.20
1445-49	40.0	137.57	20.36
1450-54	40.0	129.21	21.67
1455-59	40.0	145.26	19.28
1460-64	40.0	119.81	23.37

* In 1429, raised to 44d

** In Nov. 1433 cut to 36d, but raised to 39d in December, and to 40d in June 1434.

Table 6. Fullers' Wages in Flanders and Leiden, ca. 1350 - 1436: Money Wages per Broadcloth Fulled by a Master and Two Journeymen in Three Days, in d. groot Flemish, Grams of Silver, Units of a Flemish Basket of Consumables, and as a Percentage of the Cloth Price

Place and Year	Money Wage in d groot Flem.	Wages in Grams of Silver	Flemish Price Index 1450-74 = 100= 127.58d groot	Wage: Units of Basket of Consum-ables	Cloth Prices in £ groot Flemish	Wage as a Percent of the Cloth Price
GHENT						
1373	45d	50.13g	108	0.33	£5.000 £6.000	3.75% 3.13%
1389	45d	35.15g	121	0.29	£7.500 (est.)	2.50%
1390	32d	32.58g	131	0.19	£5.750	2.32%
1400	32d	32.58g	88	0.28	£5.360	2.49%
1420	32d	27.20g	99	0.25	£6.000	2.22%
1423	40d	34.00g	103	0.30	£6.000	2.78%
KORTRIJK						
1350	15d 4 mites (15.17d)	31.35g	52	0.23		
1374-5	41d	45.67g	107	0.30	£2.750 £3.000	6.21% 5.69%
1389	41d	32.03g	121	0.26		
1390	36d	36.65g	131	0.22	£3.200	4.59%
1400	36d	36.65g	88	0.32	£2.900	5.17%
1423	36d	29.30g	103	0.27	£2.700 £3.150	5.56% 4.76%
1429	44d	32.96g	126	0.27	£3.600	5.09%
1433 Nov	36d	31.75g	137	0.21	£3.600	4.17%
1433 Dec	39d	31.75g	137	0.22	£3.600	4.51%
1434 Jun	40d	32.56g	134	0.23	£3.600	4.63%

Place and Year	Money Wage in d groot Flem.	Wages in Grams of Silver	Flemish Price Index 1450-74 = 100= 127.58d groot	Wage: Units of Basket of Consum-ables	Cloth Prices in £ groot Flemish	Wage as a Percent of the Cloth Price
1436	40d	32.56g	96	0.33	£3.600	4.63%
WERVIK						
1389	48d	37.49g	121	0.31	£3.900	5.13%
1392	35d	35.63g	90	0.31	£3.050 £3.650	4.78% 4.00%
1466	48d	33.74g	94	0.40	£3.500	5.71%
DENDER-MONDE (2 days)						
1350	9d	18.60g	52	0.14		
1355	9d	15.72g	61	0.12		
1364	9d	13.53g	107	0.07		
1367	14d	19.21g	107	0.10		
HULST						
1350	14d	28.94g	52	0.21		
1355	14d	24.46g	61	0.18		
1357	16d	27.95g	84	0.15		
DEINZE						
1360	20d	33.50g	97	0.16		
1363	20d	30.06g	77	0.20		
1365	23d	31.56g	103	0.17		
ESTAIRES						
1430	34d 12 mites (34.5d)	25.84g	128	0.22		
1434	23d	18.72g	134	0.13		
1436	23d	18.72g	96	0.19		

Place and Year	Money Wage in d groot Flem.	Wages in Grams of Silver	Flemish Price Index 1450-74 = 100= 127.58d groot	Wage: Units of Basket of Consum-ables	Cloth Prices in £ groot Flemish	Wage as a Percent of the Cloth Price
GERAARDS BERGEN						
1443	32d	26.05g	140	0.18		
1449	32d	26.05g	93	0.27		
LINSELLES						
1395	32d	32.58g	80	0.31		
LEIDEN						
1391	* 37d 12 mites (37.5d)*		106		£4.300	3.63%
1393	* 36d 12 mites (36.5d)		79		£4.300	3.54%
1415	* 40d		107		£4.852	3.44%
1432 Jun	56d	41.94g	121	0.36	£4.333 £5.066	5.39% 4.61%
1435 Feb	46d	37.44g	108	0.33	£4.448	4.31%
1436	46d	37.44g	96	0.38	£4.448	4.31%

* The groot as a money-of-account in the Leiden accounts = 8 penninck Hollands, whose silver contents are unknown; but from 1432 reckoned in the Flemish groot coins.

Table 7. **The Purchasing Power of a Master Building Craftsman's Daily Wage in Bruges (Carpenters, Masons, Tilers, Pavers) in deniers groot Flemish and in units of a Basket of Consumables**:

Quinquennial Means (5 Years), 1350 - 1469:

Five-Year Period of the Mean	Daily Wage in d. groot Flemish. Major	Minor	Price of a Basket of Consumables in d. groot Fl.	Annual Wage in Units of this Basket of Cons. (210 days)
1350-54	5.0		74.71	14.05
1355-59	6.0		102.32	12.31
1360-64	6.55		118.77	11.57
1365-69	7.9		130.66	12.71
1370-74	8.0		146.47	11.47
1375-79	8.8		148.13	12.47
1380-84	10.0		143.46	14.64
1385-89	10.67		161.29	13.90
1390-94	9.0		125.72	15.04
1395-99	9.65		112.36	18.04
1400-04	10.0	10.0	112.65	18.65
1405-09	10.0	10.0	125.97	16.67
1410-14	10.0	10.0	121.17	17.33
1415-19	10.0	10.4	138.56	15.16
1420-24	10.0	10.0	135.95	15.46
1425-29	10.0	10.8	149.43	14.05
1430-34	10.0	11.2	163.72	12.83
1435-39	10.0	11.6	175.70	11.95

1440-44	10.0	12.0	153.83	13.65
1445-49	11.2	10.8	137.57	17.09
1450-54	11.6	10.0	129.21	18.86
1455-59	12.0	10.4	145.26	17.35
1460-64	12.0	10.0	119.81	21.04
1465-69	12.0	10.0	121.17	20.79

Table 8. **Official Flemish Coined (Traite) Values of Gold and Silver per Kilogram of Pure Metal, Bimetallic Ratios, and Official Exchange Rates on the Flemish Gold Noble, 1373 - 1454**

Date	Coined Value of Gold in £ groot per kg	Coined Value of Silver in £ groot per kg	Gold: Silver Ratios (Ratio of the Traites)	Exchange Rate on Flemish Noble in d groot	Grams of Fine Gold in the Noble
1373 Jun	39.530	3.739	10.57		
	39.896	3.739	10.67		
1380 Jan	41.692	4.121	10.12		
	42.598	4.121	10.34		
1383 Sep	45.570	4.300	10.60		
1384 Sep	35.120	3.553	9.89		
1386 Apr	41.727	4.050	10.30		
1386 Oct	41.727	4.107	10.16		
1387 Apr	49.811	4.910	10.14		
1388 Oct	55.566	5.337	10.41	102d	7.649
1390 Jan	39.223	4.050	9.68	72d	7.649
1391 Jan	39.223	4.086	9.60	72d	7.649
1393 Jun	39.223	4.050	9.68	72d	7.649
1407 Jul: Proposed	39.636	4.050	9.79		
1409 Aug	33.443	3.482	9.60	60d	7.649
1416 Dec	37.554	4.263	8.81	60d	6.657
1418 Jun	47.290	4.832	9.79	76d	6.657
1422 Apr				84d	6.657
1425 Jun:F	56.784	4.832	11.75	92d	6.751
1425 Jul:N	56.784	4.519	12.57		
1426 Jul:N	64.412	4.558	14.13		
1426 Nov:F	64.412	4.832	13.33		
1427 Sep:F	50.672	4.832	10.49	84d	6.907
1428 Jun:N	62.054	5.116	12.13		
1428 Nov:F	58.835	5.474	10.75	96d	6.799

Date	Coined Value of Gold in £ groot per kg	Coined Value of Silver in £ groot per kg	Gold: Silver Ratios (Ratio of the Traites)	Exchange Rate on Flemish Noble in d groot	Grams of Fine Gold in the Noble
1429 Feb:N	64.052	5.525	11.59		
1429 Jun:N	65.834	5.756	11.44		
1429 Sep:B	64.248	5.453	11.78		
1430 Jan:N	65.834	5.756	11.44		
1430 May:B	64.248	5.453	11.78		
1430 Dec:N	65.985	5.756	11.46		
1431 Mar:B	64.722	5.453	11.87		
1431 Mar:N	65.985	5.756	11.46		
1431 Apr:N	66.504	5.815	11.44		
1431 Sep:N	67.031				
1431 Dec:N	70.381	6.139	11.46		
1432 Oct:N	73.110	6.139	11.91		
1433 May:N	77.176	6.634	11.63		
1433 Aug:N	57.883	4.975	11.63		
1433 Oct	55.591	5.116	10.87	88d * 92d	6.799 * 6.962
1443 Mar	57.907	5.116	11.32		
1454 Jan	61.286	5.116	11.98		

* The English noble of 1411 - 64

F: Flanders
N: Namur
B: Brabant
From October 1433: the Burgundian Low Countries

SOURCES FOR TABLES 2 - 8:

Cloth Prices: from cloth purchases for civic officials in Stadsarchief Gent, Reeks 400:5 - 10, Stadsrekeningen 1347/48 to 1429/30; Stadsarchief Brugge, Stadsrekeneningen 1370-71 to 1469-70 (For Wervik and Kortrijk); Gemeentearchief Leiden, Stadsrekeningen 1390-91 to 1435-36.

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