The evolutionary dynamics of the credit relationship between Henry III and Flemish merchants, 1247-1270

Carol Alexander, Adrian R. Bell, Chris Brooks and Tony K. Moore
ICMA Centre, University of Reading

November 27, 2011

ICMA Centre Discussion Papers in Finance DP2011-25

ICMA Centre • The University of Reading
Whiteknights • PO Box 242 • Reading RG6 6BA • UK
Tel: +44 (0)1183 788239 • Fax: +44 (0)1189 314741
Web: www.icmacentre.rdg.ac.uk
Director: Professor John Board, Chair in Finance
The ICMA Centre is supported by the International Capital Market Association

The evolutionary dynamics of the credit relationship between Henry III and Flemish merchants, 1247-1270

Carol Alexander, Adrian R. Bell, Chris Brooks and Tony K. Moore*

November 27, 2011

Abstract

This paper develops a model to analyse the financial relationship between Henry III, king of England between 1216 and 1272, and one group of creditors, namely the Flemish merchants that provided cloth to the royal wardrobe. From the surviving royal documents, we have reconstructed the credit advanced to the royal wardrobe by the merchants of Ypres and Douai for each year between 1247 and 1270, together with the arrears owed by the king at certain points. The model is flexible and able to capture the dynamics of the actual number of merchants trading in England as well as the extent to which the king made debt repayments.

JEL classification: N13, N23, C79

Keywords: Medieval trade, sovereign borrowing, Flemish merchants, evolutionary dynamics, expected utility.

*All authors are members of the ICMA Centre, University of Reading. Contact: Adrian R. Bell, ICMA Centre, University of Reading, Whiteknights, Reading, RG6 6BA, United Kingdom. e-mail:a.r.bell@icmacentre.ac.uk. Telephone: +44-118-378-6461. Fax: +44-118-931-4741.

1 Introduction

The towns of Flanders were the great centres of the medieval cloth industry. During the thirteenth century, the bulk of Flemish exports were probably traded at the great international fairs of Champagne, where the Flemish cloth was exchanged with Italian merchants for silk, spices and other luxury goods. However, Flemish merchants were major exporters of finished cloth and other goods to England, selling their wares at the cycle of fairs held in Eastern England: Stamford at Lent, St Ives at Easter, Boston at Midsummer, Winchester in September and Northampton in November (Moore, 1985, 10). In addition, there was a symbiotic economic connection between England and Flanders, since the Flemish cloth industry depended on imports of English wool. In essence, Flemish merchants exported cloth and other luxury goods to England and used the proceeds to buy English wool, which was then exported back to Flanders to provide the raw material for the cloth industry (Lloyd, 1977, 2-6). It was via Flanders and thence Champagne that England entered the wider European economy.

Within England, the royal household was by far the biggest single customer for cloth, wax and other high-status goods. The high-quality cloth produced by the Flemings was particularly valuable to the king. First, he needed clothing of suitable quality (i.e. superior to anyone else in the kingdom and equivalent to that of his peers, the rulers of other states) for himself and his family. Second, all lords distributed robes to their followers once or twice a year – this was of great symbolic importance and, again, the quality of the robes given would need to match the king's status as the greatest lord in the kingdom (Vale, 2004). The king's purchases were made by the buyers of the great wardrobe who accounted to the keeper of the wardrobe (Tout, 1920-33, IV, 354-68). According to the enrolled accounts of the keepers of the wardrobe, which survived for nineteen years between 1245 and 1268, the buyers of the great wardrobe spent some £21,550, an average of over £1,134 each year. Much of this comprised cloth purchased from Flemish merchants.

During the first half of Henry's reign, the buyers of the wardrobe were generally issued with cash advances (*prests*) from the royal treasury in order to make purchases at the fairs. From the later 1240s, however, the buyers increasingly purchased goods on credit. As Henry's finances came under greater and greater pressure in the 1250s and 1260s, he frequently failed to repay these advances. The merchants were thus entangled within the royal financial system. The buyers of the wardrobe were also empowered to invoke the royal right of *prise* to compulsorily purchase goods if they could not agree voluntary terms of sale with the merchants (Moore, 1985, 127-31). This ability to buy goods (by compulsion if necessary) on credit and then to defer repayment can be seen as a form of royal tax imposed on the merchants trading in England.

This paper will examine Henry III's management of his relationship with his creditors during the turbulent period 1247-1270 by focusing on a case study of the provision of credit to his wardrobe by the merchants of Douai and Ypres in Flanders. As set out above, the financial relationship between the English king and the Flemish merchants was of central importance to both parties. Our formal mathematical treatment explains their behaviour by modelling both mercantile trading patterns and the management of royal finances. Whilst a number of the merchant's decisions may at first appear counter-intuitive, our model provides a deeper analysis that can explain their behaviour as optimal.

First, we capture the factors that influenced the decisions taken by the king and the merchants. The relationship between Henry and the Flemish merchants is particularly well-suited to such an approach because there were repeated interactions between the two parties over many years. Then a reconstruction of the king's payment history, based on annual figures for the goods provided on credit to Henry by the merchants between 1247 and 1270, is used to explain the strategies adopted by the king and the merchants of Douai and Ypres. To test the validity of the model, we compare the observed behaviour with the dynamics from simulations of the model with different parameters. In particular, the model captures the key features of the relationship and can simulate plausible paths for the numbers of merchants trading in England and for the repayment schedule of the king.

The remainder of the paper is as follows. Section 2 describes the surviving sources and the data that are used to support the model; Section 3 reconstructs the historical experience of the king and Flemish merchants; Section 4 specifies the model and Section 5 explores its predictions; Section 6 concludes and offers suggestions for further research.

2 Sources and Data

The basic source for our reconstruction of the relationship between the king and the merchants is the enrolled royal letters patent obligatory (TNA C 66, published in a calendered version in CPR) and writs of liberate (TNA C 61, edited in CLR) made out in favour of the Flemish merchants. Initially, the buyers of the wardrobe would have given the merchants wardrobe bills or (debentures, informal letters under their own seals), or even tallies for the sums owed to them. For added security, the merchants could take these bills to the Chancery and exchange them for royal letters patent obligatory (Moore, 1985, 122-5). These were formal debt instruments issued under the great seal and witnessed by the king, recording both the sum owed by the king and the terms on which that credit was extended. They may also include additional provisions, such as security clauses. The merchants would then have to exchange their wardrobe bills or letters obligatory for royal writs of liberate. These ordered the treasurer and barons of the Exchequer, or a named collector of royal revenues in the localities, to disburse a certain sum to the merchants. Some of these writs give more information about the reasons for the payment, such as the names of the merchants or the fairs at which the purchases were made, but others are more laconic.

These credit arrangements were a matter for individual negotiation, but the terms appear to have been fairly standard. For example, in May 1248, the king promised a group of merchants from Douai that he would pay them all that he owed them at the quinzaines of Michaelmas (14 October). Moreover, he promised that, in future, 'for what he buys after Easter, they shall be satisfied at the Exchequer of Michaelmas and for what he shall buy after Michaelmas, they shall be satisfied at the Exchequer of Easter' (CPR 1247-58, 16). Similarly, in 1260, the king issued a group of merchants from Ypres with letters patent obligatory stating that he would pay the £100 24s 8d that he owed for cloth bought at the fair of St Ives (c.24 April) on the quinzaines of Michaelmas (14 October) (CPR 1258-66, 69). Such agreements anticipated a term of roughly six months although, as described below, royal repayment was frequently tardy.

A final important piece of information provided by the historical sources is whether the king provided any security for the repayment of the credit advanced to him. At first, the merchants received no special priority or security for the goods that they provided to the wardrobe. Later, the king seems to have included priority or security clauses within his writs of liberate and letters obligatory, presumably in order to reassure the merchants of their chances of being repaid. The various forms of security that the king could offer are listed below, in ascending order of credibility:

1. Unsecured advances. This was the default situation.

2. Prioritised repayment, whereby the king ordered the repayments to the merchants to be given a higher priority than his obligations to other royal creditors. This was, of course, not very reliable when the king found himself under pressure from more politically-significant figures to move them to the front of the queue. Furthermore, the royal treasury was frequently empty and even priority orders for payment were often not carried out.

3. Assignment, whereby the king ordered the collectors of royal revenues in the localities to pay the monies collected directly to royal creditors rather than into the treasury. This can be described as a form of securitisation, although it differs from tax farming in that the creditors did not collect the revenue directly or retain any profits themselves. This approach was necessary because money was pouring out of the treasury as fast as, or even faster than, it could be deposited there and assignment meant that creditors did not have to fight their way through the crowd waiting for repayment at the treasury.

4. Naming of pledges to stand surety for the repayment of the loan. Henry occasionally ordered the buyers of the wardrobe to make purchases for him on their own credit, for which he would later reimburse them. Although the king himself could not be prosecuted for debt before his own courts and royal property and goods could not be seized or distrained upon to force repayment, a private individual could be so pursued. Moreover, making leading magnates or royal officials personally responsible for royal debts provided them with an incentive to use their influence within the royal administration to ensure speedy repayment.

5. Placing royal jewels in pawn as security for the repayment. If the debt was

not repaid on time, the merchant (or a third party to whom the goods were entrusted) could sell the goods to recover their money. Frequently, the value of the pawned goods was greater than the debt owed, or symbolically significant items might be chosen, for example the Great Crown of England under Edward III. In general, it seems that this method was the most effective at committing the king to repayment, which is probably sufficient explanation for why the king avoided it whenever possible.

6. The most extreme example was to refuse to supply goods except for payment in cash on the spot. However, one of the great attractions of using the Flemish and Italian merchants was precisely their ability to provide goods on credit to the often cash-strapped crown, and the king was probably willing to pay a premium for this credit. Moreover, if the merchants so refused, the king could always invoke his right of *prise* (compulsory purchase).

We identified all entries from the patent and liberate rolls relating to the merchants of Douai and Ypres. This included both documents that explicitly state that the merchants involved were from Douai or Ypres, as well as those involving named merchants known from other sources to have been of those towns. All the relevant data were then extracted and entered into a database. Particular care was taken to match all letters or writs relating to the same transaction to avoid double-counting. Where it is unclear whether a royal letter or writ refers to a new obligation or to previous transactions, it has been omitted from the dataset. The results are listed in Tables 1 and 2 for the merchants of Ypres and Douai respectively. According to our reconstruction, between 1247 and 1270, Henry III recognised total debts of £6,879 to the Douaissiens and £5,502 to the Yprois for cloth provided to the wardrobe on credit, and this may be an under-estimate. These advances are broken down into annual figures for the two sets of merchants in Figure 1. We also noted other features such as whether the king promised any security for repayment or if the buyers were described as having bought goods (i.e. voluntary sales) or taken goods (i.e. invoking *prise*).

Figure 1 suggests an interesting difference between the behaviour of the two sets of merchants. The Douaissiens seem to have been active in England and to have extended credit to Henry throughout the period up to 1270, although the extent of the credit that they advanced fluctuated. The relationship between the merchants of Ypres and Henry III is more interesting. It is possible to identify three periods of equilibrium (1247-1254, 1260-1264 and 1267-1269), during which the Yprois provided goods on credit to the crown before being interrupted by shocks. In 1255 the merchants of Ypres seem to have decided to cease trading in England altogether, in 1264 trade was disrupted by the outbreak of civil war in England, and in 1270 a dispute between the countess of Flanders and the English king halted trade between England and Flanders. In the first two cases, the relationship interrupted in 1254 and 1264 was later resumed after negotiation, in 1260 and 1267 respectively. It is interesting that both of these resumptions occurred following English visits to Flanders. In 1260, Henry III was at St Omer and in 1267 Richard de Ewell, one of the then buyers of the wardrobe, was in Flanders. This suggests that it was the English who took the initiative in establishing negotiations. When the Anglo-Flemish trade war was resolved in 1275, however, Edward I did not resume the English Crown's direct relationship with the Flemish merchants but rather employed an Italian merchant society, the Ricciardi of Lucca, as intermediaries (Kaeuper, 1973).

One important point to note is that the simple issuing of a writ of liberate does not automatically mean that this writ was honoured in full and on time. The discharge of writs of liberate was recorded in the issue rolls (TNA E 403. These records are unpublished). The single-column chronological receipt rolls record each writ paid in full during that term, in the order in which they were satisfied. These are supplemented by multiple-column memoranda of issue rolls, which record all payments made towards each writ of liberate during that term. In theory, the two sets of issue rolls should enable us to track any payments made towards each writ of liberate and when that writ was finally paid in full. Unfortunately, there are major gaps in the sequence of surviving issue rolls during this period. There are no issue rolls between 1247 and Easter 1252, and only one roll for the period Easter 1260 to the end of the reign. Moreover, the best surviving sequence is for Michaelmas 1256-Michaelmas 1259/60, during which time the financial pressures on the king were at their greatest and there are very few records of payments made to the Flemings.

The gaps in the series of issue rolls can be supplemented with occasional statements of accumulated royal debts. For example, in 1262-3 Henry III recognised arrears, mostly dating from before 1257, of £1,462 to the Douaissiens (CPR 1258-66, 221) and £1,031 to the Yprois (CPR 1258-66, 262). Later, more comprehensive statements of the king's debts to the merchants of Douai and Ypres were compiled in 1269 when, excluding the above arrears from before 1257, the king owed the Yprois a further £640 and the Douaissiens £984 (CLR 1267-72, 105-6). Usefully, the latter source also distinguishes between the arrears owed by different buyers of the wardrobe or from the accounts of the various keepers of the wardrobe. Using the data displayed in Tables 1 and 2, we can calculate the total credit advanced during each wardrobe keepership and, comparing this to the debt outstanding in 1269, we can calculate the royal repayment rates during each of these periods, as shown in Table 3 (for an explanation of accounting practices, see Tout, 1920-33, IV, 416-29; Wild, 2010). It should be noted that repayment rates during each keepership probably did not remain constant, as suggested by the table, but varied depending on the king's financial situation.

Table 3 shows that as late as 1269, Henry had still not repaid as much as one-third of the credit provided to him during the preceding twenty-two years. However, this average figure disguises considerable variations. Between 1255 and 1259, the king may have repaid less than one-quarter of the credit advanced him by the merchants of Douai and during the keepership of Henry of Ghent (1261-1264), arrears owed exceeded 50% for the Douaissiens and approached 75% for the Yprois. This can probably be explained by the disruption caused by the domestic unrest of 1263 and full-blown civil war of 1264-5. Between 1258 and 1261 and 1265 and 1268, however, the king repaid almost all of the credit advanced to him. Another interesting variation concerns the arrears owed to the merchants of Douai and Ypres. Up to c.1267, the Douaissiens seem to have been markedly more successful than their Yprois counterparts in securing repayment from the king. During 1267-1269, however, this was reversed, and the Yprois were owed a lower rate of arrears than the Douaissiens. These changes in the king's payment performance are vital for interpreting the strategies adopted by the merchants and for understanding why the merchants of Douai and those of Ypres sometimes made different decisions.

This all reflects the fact that English state finance and government debt was organised in a fundamentally different way in the Middle Ages than today. Most notably, there was, generally speaking, no funded national debt in the modern post-1694 sense. The king did not sell gilts (Treasury bonds) to investors and then pay his creditors from the proceeds, although occasionally he would contract short-term loans from merchants or wealthy magnates in order to settle particularly pressing expenses in cash. Rather, the king or his officials issued debt instruments to his creditors, in the form of wardrobe bills, tallies, and more formal letters obligatory. The purchase of goods on credit can be considered one of three main categories of royal obligations, the other two being formal loans and promises of one-off cash payments or annuities to reward services rendered (some of these can best be viewed as wages and others as a method of buying political or military support). Royal creditors then had to cash these in by obtaining a writ of liberate ordering payment to be made either out of the royal treasury or by a named royal official (Tout, 1920-33, II, 47-55, IV, 416-29). There are indications of a limited and OTC secondary market trading such instruments, but it is not clear how extensive this may have been (Steel, 1929; Sayles, 1931).

In effect, the king could temporarily boost his financial resources by issuing more debt (in the form of goods purchased on credit or wages promised for service) and then deferring repayment. Failure to meet these obligations in full and on time could be viewed as a form of 'soft' default and used as a form of taxation at times of financial stress. For example, between 1261 and 1264, Henry of Ghent, the keeper of the wardrobe, received a total of £37,265 from the treasury or various royal officials but stated that he had paid out £40,776 for the king's expenses. This apparently left Ghent with a *surplusagium* of £3,511 on his account but the surplus actually represents unredeemed wardrobe debt. Ralph of Sandwich, keeper of the wardrobe for only four months from April to August 1265, nevertheless left a 'surplus' of £743 12s 4d. His successor, Nicholas of Lewknor, expended some £32,801 between August 1265 and March 1268 but had received only £28,081, leaving a surplus of £4,719 10s, 'the whole of which is owed to divers merchants for the expenses of the king's household, and to divers merchants for goods taken from them'. Finally, Peter of Winchester, keeper until the end of Henry's reign in November 1272, exceeded his receipts of £37,762 by some £5,061 11s 9d, 'of which £934 3s $6\frac{1}{2}$d is owed to divers merchants for cloth, furs, wax and divers other goods purchased for the great wardrobe by Richard de Ewell' and the remainder 'was owed to divers creditors both in London and elsewhere within the realm for divers goods taken from them for the expenses of the king's household'. These figures are summarised in Table 4.

The practice of over-issuing wardrobe debt became increasingly important during the second half of the reign of Henry III, the period covered by this paper. This reflected a systemic fiscal crisis resulting partly from fundamental structural changes in the nature of the king's finances, which has been interpreted as the transition from a 'domain state' to a 'tax state' (Ormrod and Bonney, 1999). The first part of this transition took place during Henry III's reign. His father John's abuses of his prerogative had led to civil war, which was still undecided when Henry succeeded to the throne as a child of nine in 1216. Magna Carta, reissued by Henry's advisors during his minority, restricted the king's ability to raise income from his feudal and judicial rights (Holt, 1992). Unfortunately, Henry himself was unable to make up for these reduced revenue streams from domain rights by securing grants of taxation, and so the completion of the transition - the creation of a tax state - had to wait until the reign of Henry's son and heir, Edward I.

One consequence of this failure to address the structural problems of royal finance was that, during the course of his personal rule and especially from c.1245, Henry III's expenditure consistently outstripped his revenues (Stacey, 1987). This meant that Henry was unable to meet all of his obligations, such as paying in full and on time for goods provided to the wardrobe on credit or the fees owed to royal annuitants. Instead of raising new income, economising on his expenditures or contracting loans, all of which would have had significant political costs, Henry took the route of least resistance and simply allowed significant arrears to build up. Moreover, the increasing difficulty in getting royal writs of liberate honoured led to the development of a queue for repayment, in which the creditor's position did not depend on the seniority of the debt owed to them but rather on the political influence that they could bring to bear (Carpenter, 1985; Ridgeway, 1989).

Ultimately, the collapse of the king's finances during the 1250s forced Henry to submit to a baronial committee charged with reforming the state of the realm and the king's finances. This precipitated a period of political unrest between 1258 and 1267, known as the period of reform and rebellion (Treharne, 1971). The conflict between Henry and his political opponents, who came to be led by his brother-in-law (and one of his biggest creditors) Simon de Montfort, turned violent in 1263 and culminated in the Barons' War of 1264-7, which continued even after Montfort's death at the battle of Evesham in 1265 (Maddicott, 1994). The exigencies of royal finance during a period of unrest and civil disturbance meant that many of the arrears accumulated before 1258 continued to go unpaid and even to grow as Henry failed to make payments on annuities or for new provisions of goods to the wardrobe on credit. It was only after the re-establishment of some kind of political order after 1267 that Henry III's council could tackle the problems of royal finance, a process that continued during the early years of his son and heir Edward I.

While it is obvious how the use of credit (and the consequent ability to manage fiscal shortfalls by deferring repayment of wardrobe debt) benefitted the king, it is less clear what the merchants gained. It is possible that the Flemish merchants, who were generally better capitalised than their English competitors, may have been able to steal market share by allowing impecunious royal and aristocratic consumers to purchase cloth on credit. Furthermore, the repayment terms envisaged in the agreements between Henry III and the Flemish merchants would also have fitted neatly into the trading pattern of the merchants; they could sell their goods to the king on credit at the fair of St Ives, and then purchase wool for export for Flanders, initially with a small down payment and then paying the remainder after they had been repaid by the king. Finally, it is also likely that interest was charged on this credit, although, owing to the usury prohibition, interest payments had to be disguised (Bell, Brooks and Moore, 2009). For instance, debts acknowledged by the king could incorporate interest by inflating the purchase price of the goods or by including a gift within the total debt. The debts recognised by the king may therefore have included a 'mark-up' over and above the purchase price of the goods, to cover the anticipated interest up to the envisaged repayment date. This practice was known as 'chevisance' in the later Middle Ages. Further delays in repayment may also have been 'priced in' by the merchants, based on the king's credit history. So long as the king's credit standing was good, and they anticipated reasonably prompt repayment, the merchants may well have been happy to advance him credit, since they would have earned an additional return on repayment (at this time, interest rates on formal loans were 15-20% per annum).

One way of conceptualising this practice was that the king's ability to buy goods on credit and then to defer repayment functioned as a tax imposed on the merchants for trading in England. Moreover, the king's ability to impose *prise* and compulsorily purchase goods meant that the only certain way to avoid this tax was not to import goods for trade in England at all. The size of this tax was determined by 1) the total value of goods purchased on credit by the king and 2) the king's repayment performance. In effect, the more the king took and the less he repaid, the greater the tax. The Flemish merchants were certainly willing to pay for access to the English market. In early 1233, the merchants of Ypres offered the king £100 to have royal letters patent of safe conduct by land and to any English port (CFR 1232-1233, no. 50). Four years later, the merchants of Douai offered 400m (£266 13s 4d) for similar letters (Moore, 1985, 31). As we shall see, in 1259-60 both sets of merchants paid again for confirmation of their charters of liberties. This suggests that there was considerable profit to be made from trade with England and that the Flemish merchants were prepared to pay some form of taxation. So long as this implicit tax did not exceed the marginal profits that the merchants expected to make from trading in England (rather than selling their goods in another market, such as the Champagne fairs), then they would continue to trade in England. However, if the king taxed the merchants too highly, then they might choose to stop trading in England and, indeed, the king's political opponents claimed that this had happened in 1258.

Although the records of the medieval English Exchequer are almost unique in the amount of information that they provide about the royal finances at such an early date, there are substantial gaps in our ability to quantify other aspects of the medieval economy. For instance, to properly calculate the financial burden of these exactions, it would be necessary to know, amongst other things, the total volume of Flemish trade with England, the cost of production of Flemish cloth, and the differing transactions costs for merchants trading in England and at the fairs of Champagne. However, it is not possible to place reliable figures on such inputs. For example, there are two major problems with trying to estimate the cost to the merchants of the cloth supplied to the king. First, the data we have for royal purchases of cloth do not itemise the number, types and quality of cloth bought. Moreover, we do not have a sufficiently extensive or reliable data series for the prices of the sorts of cloth that the king would have bought at this time. There are some contemporaneous price lists that survive from Italian and Spanish markets for Flemish cloth (Chorley, 1987), but it is essentially impossible to draw comparisons to prices in England - especially without knowing the types of cloth involved. Second, there are no surviving accounts from the merchants themselves. There are some estimates of the relative cost of the various components used in the production process, but these are from a much later period – the fifteenth and sixteenth centuries – which are not strictly comparable with the thirteenth century (Munro, 1983). Finally, there is little indication of expected profit margins from trade and, in any case, the luxury cloth trade may well have had higher margins to compensate for the often dilatory repayment by the high status purchasers of such goods. Since the data that would be required to underpin a precise analysis of the relationship between the merchants and the monarchy is absent, we adopt a somewhat more abstract approach where we construct a model which we then simulate from to obtain plausible paths for the variables of interest, as we describe in Section 4.

3 The Historical Chronology

We will now examine the chronology of the relationship between Henry III and the Flemish merchants in more detail, focusing on the merchants of Ypres but investigating where their behaviour differed from that of their fellows of Douai. The information gleaned from a careful consideration of the primary sources is necessary in order to appropriately calibrate the mathematical model developed subsequently.

Henry III first began to purchase cloth on credit consistently and on a large scale in 1247. Between 1247 and 1254, Flemish merchants advanced cloth worth some £5,771 to the king on credit, an average of £721 each year, of which the Douaissiens provided roughly two-thirds (£467 p.a.) and the Yprois one-third (£255 p.a.). The scale of these advances may have been linked with trading privileges granted to the merchants. In

May 1248 Henry III granted quittance from *prise* for five years to some twenty-named merchants of Douai, possibly those from whom he had purchased over £1155-worth of cloth in the previous year and for which he had obviously not yet paid in full (CPR 1247-1258, 17). The liberate and patent rolls between 1247 and 1254 generally describe 'purchases being made' or cloth being 'bought' from the merchants rather than cloth being 'taken' to the king's use, suggesting that the buyers were honouring the grant of May 1248 and negotiating voluntary sales rather than enforcing prise. Moreover, the merchants of Ypres were not formally granted such quittance from *prise* but it seems that the buyers also purchased cloth from them rather than invoking prise. It is interesting that Henry was able to secure much greater access to cloth on credit before 1254, when he curtailed some of his prerogative rights and avoided making compulsory purchases than after that time, when he seems to have resorted to seizing cloth from the Douaissiens. By promising that he would not take any cloth from the merchants without their consent, Henry encouraged more merchants to come to England with more merchandise, and they were thus able to support greater advances to the king.

This equilibrium held until 1255. The early 1250s were a time of financial stringency for Henry III's government (Cassidy, 2011) and, unfortunately for them, the Flemish merchants had found themselves near the back of the queue when it came to securing payment of the king's obligations. A certain amount of royal dilatoriness seems to have been expected and was presumably factored into the king's relationship with his creditors and so, despite this poor record of repayment, the Yprois seem to have been happy to extend the king's line of credit until 1255, when they lost patience and called a 'credit strike'. Between 1255 and 1260 the merchants of Ypres do not seem to have advanced any further credit to the king and may even have ceased to trade in England. This may be explained by the king's extremely poor performance in repaying the Yprois for credit advanced to the wardrobe; in 1263 he had only paid for less than half of the purchases made from the merchants of Ypres before 1254. Hence the decline in the king's credit rating increased the expected tax burden to the point where it was no longer rational for the Yprois to continue trading in England. Moreover, the protection from prise granted in 1248 had expired, which meant that any merchant bringing goods to England ran the risk of having their goods compulsorily purchased. Finally, in 1253 and 1254 Henry seems to have made heavy-handed attempts to enforce the assize of cloth, which set statutory limits for its dimensions. Complying with these regulations would have imposed significant expenses on the Flemings (Moore, 1985, 132-37).

All of this would have imposed additional costs on the Flemish merchants and, as a result, the merchants of Ypres seem to have decided that trading in England was no longer viable. It is suggestive that, while in 1240 the Yprois and Douaissiens had jointly-issued a set of ordinances to regulate their activities in England, in 1258 the merchants of Douai issued their own regulations that did not mention Ypres (Moore, 1985, 297-301). This boycott by foreign merchants was also commentated on by contemporary critics of Henry's governance. In 1258 they complained that 'the lord king scarcely ever pays for his prises, so that many English merchants are impoverished beyond measure, while [foreign] merchants for this reason refuse to come with their goods into the kingdom, wherefore the land suffers grievous loss'. A later statement of the reformers' case against Henry's rule from 1264 argued that the king 'so grievously oppressed [the foreign merchants] with these prises and exactions that they shun the kingdom and betake themselves elsewhere with their merchandise to the great loss of the kingdom' (Treharne and Sanders, 1973, 84-7 and 274-5).

While the Yprois pulled their credit in 1255, the merchants of Douai did not, but continued to trade in England and to extend credit to the wardrobe. There are a number of plausible explanations for this. First, it is possible that the Douaissiens had a more optimistic view of the credit standing of the English Crown. As we can see from Table 3, the Douaissiens had been significantly more successful than the Yprois in collecting on the debts owed to them. They had advanced £3,733 up to 1254, of which some £1,014 was probably in arrears. This is equivalent to an arrears rate of 27.2% - in other words, the Douaissiens were receiving nearly three-quarters of the sums promised to them compared to less than half for the Yprois. Alternatively, it may be that the merchants of Douai, who had advanced more credit to the English crown than their fellows of Ypres, decided that it was worth continuing to extend credit in the hope of recovering the arrears owed to them. A final explanation is that the Douaissiens may have been more closely linked to the English market than the Yprois, whose interests may have been directed more towards the fairs of Champagne. The records of the fair of St Ives provide some support for this; in the 1280s, the Yprois paid £6 rent for their booths, while the Douaissiens paid between £5 and £17 (Moore, 1985, 34). If the business of the Douaissien merchants trading in England was larger than that of the Yprois, then they could afford to pay a greater 'tax' and still remain profitable.

Although the Douaissiens did not cut off Henry's credit entirely or cease to trade in England after 1254, they do seem to have reduced the line of credit that they advanced to the king. Between 1255 and 1259, the king recognised debts of £678 to the merchants of Douai (£136 p.a.), around one-third of the annual credit that they had advanced before 1254. Moreover, the terminology of the documents changes, describing cloth as being 'taken' rather than 'bought'. This suggests that the buyers of the wardrobe were no longer able to agree mutually-acceptable terms for purchases from the merchants of Douai, forcing them to resort to compulsory purchases. They did not, however, impose these compulsory purchases at the same rate as before 1254. This is significant because it suggests that the buyers were deliberately moderating their demands for cloth for fear of forcing the Douaissiens out of England as well as the Yprois. This was particularly important given the dramatic drop in the king's repayment record. There are only two surviving payments to the merchants from the issue rolls: In Easter term 1257 the king paid £13 1d to the merchants for purchases made from them in 1252 (TNA E 403/14, m.1); and in Michaelmas term 1257-8 he paid £57 to Walter Waubayn for purchases made in 1254 (TNA E 403/16, m.1). In 1257, Waubert Bondenier also managed to collect £160 towards various old wardrobe debts (CLR 1251-1260, 384). The king's repayment rate 1254-1258 was thus only 33.9%, less than half of the pre-1254 level. Moreover, all the recorded repayments were made towards old debts and the king may well have made no payments for current advances. Given the continued financial problems plus the uncertain political conditions, it therefore made sense for the merchants to reduce their exposure to the English market.

The structural crisis in the king's finances apparent from 1255 was exacerbated by a series of poor harvests in the later 1250s, causing widespread famine in 1258. As so often, a financial and economic crisis was followed by a political one. In 1258 a faction within the royal court, the Queen's Savoyard relations, who were competing for scarce royal patronage with their rivals, the king's Poitevin half-brothers, joined forces with the external critics of Henry's governance to force the king to recognise the appointment of a baronial committee to reform the realm (Carpenter, 1984). The baronial reformers remained in power until early 1261 (Treharne, 1971).

Meanwhile, the relationship between the king and the merchants of Ypres was resumed in 1260. Henry and his closest allies had spent autumn 1259 and spring 1260 in France, originally to conclude a peace treaty with the French king, although Henry then postponed his return to England in an attempt to build up his resources and play on the divisions within the baronial council. These plans required a source of funding, both for immediate loans and also the resumption of supply to the wardrobe on credit. As a result, Henry turned to the Flemish merchants. In December 1259, Henry confirmed the Yprois' trading privileges in England, in return for 100 marks paid into the wardrobe. Moreover, before 20 April 1260 the échevins and merchants of Ypres loaned Henry £500, to be repaid in London on 2 May 1260. Shortly afterwards, the merchants of Ypres provided goods worth over £100 to the buyers of the wardrobe at the Easter fair of St Ives (CPR 1258-1266, 69, 109-10, 121). There may have been an element of personal negotiation behind the resumption of the relationship between the king and the Yprois, since Henry was then in northern France, close to Flanders. In January 1261 the merchants of Douai offered the king 100m (£66 13s 4d) for a similar confirmation, but this fine was not paid in cash but rather deducted from a debt of £90 that the king owed the Douaissiens (CFR 1260-61, no. 159). During the following five years, 1260-1264, the Flemings advanced cloth and loans worth £2,085 (£417 p.a.). Although not as high as advances before 1254, this marked a significant recovery from the nadir of 1255-9. The return of the Yprois to England also led to the issuing of a new set of regulations by the merchants of Douai and Ypres trading in England, now joined by those of Ghent, Cambrai and Dixmude (Moore, 1985, 301-2).

In order to secure the resumption of this relationship, Henry or his representatives had to offer the merchants improved terms. First, he had confirmed the merchants' trading privileges in England, including the concession that no merchant of Ypres or Douai should have their goods seized 'for any debt whereof they are not pledges or chief debtors', i.e. should one of their fellow townsmen default on his obligations to an English merchant. It has been argued that such 'collective reprisals' were one of the main ways in which domestic merchants could take action against foreign defaulters and immunity was thus a very valuable right (Grief, Milgrom and Weingast, 1994). Second, the king put in place a more credible commitment that he would repay the merchants for their advances; in particular, in 1262 he pledged silver plate and vessels worth over £600 for the repayment of £600 owed to the merchants of Douai, Ypres and Lucca for provisions to the wardrobe (CPR 1258-1266, 213-14). In 1263, Henry again had to pledge silver plate worth 1,000 marks (£666 13s 4d) for the repayment of goods advanced by the Lucchese. In both cases, these advances seem to have been repaid in full and on time. Finally, the king re-opened the question of the accumulated arrears owed to the merchants. In July 1262 the merchants of Douai were assigned an annual payment of 400 marks owed by Hugh Bigod, formerly the justiciar during the period of baronial control, for the wardship of the lands and heir of William de Kyme, until the merchants should be satisfied for £1,461 18s owed them. In 1265 the Exchequer noted that Bigod had paid £1,985 of this debt into the treasury since 1260, but do not specify whether any of it reached the Douaissiens (CPR 1258-66, 221; TNA E 372/109, r.5 m.1). In 1263, the king ordered the repayment of the arrears of £1,031 owed to the Yprois from the revenues of the scheduled judicial eyre in Lincolnshire, but the merchants do not seem to have received any money from this source (partly because of the domestic political crisis described below) and the whole sum was still outstanding in 1269 (CPR 1258-1266, 262; CLR 1267-1272, 105-6). Even if these provisions fell through, they were still a demonstration of royal good faith.

These credit arrangements were again interrupted in 1264, this time by an 'exogenous shock' in the form of renewed political crisis in England. In 1263 Henry's half-brother Simon de Montfort had returned to lead the opposition to the king, and the failure of an attempt at mediation by the French king Louis IX in early 1264 led to civil war. Montfort was initially successful, defeating Henry at the battle of Lewes in May 1264 and effectively ruling England in the king's name until his own defeat and death at Evesham in August 1265 (Maddicott, 1994). Even after Montfort's death, however, the king's harsh policy of disinheriting his opponents ensured that bands of former rebels continued to hold out until the summer of 1267, raiding the properties of royalists and also plundering merchants (Knowles, 1982). In these disturbed circumstances (the royal records describe it as 'the time of turbulence in the realm'), it is not surprising that the Yprois choose not to extend any credit to the Montfortian regime. Again, the Douaissiens followed a different strategy and continued to extend credit to the buyers of the wardrobe even during Montfort's ascendancy, albeit at a reduced rate (providing cloths worth £120 at Christmas 1264). The Flemish merchants were in a delicate position, because Queen Eleanor had assembled a royalist army in Northern France, partly paid for with money borrowed from the Flemish towns (Howell, 2001, 213-17; Espinas, 1913, III no. 490).

The large-scale provision of cloth on credit by the merchants only resumed in the spring and early summer of 1267, once the threat from the 'disinherited' seemed under control. Until the outbreak of the trade war between England and Flanders in 1270, the merchants advanced credit worth £2,289 or over £763 per annum, a higher rate than before 1254. In May and June 1267, Richard of Ewell, the buyer of the wardrobe, was in Flanders and received cloth and cash to the value of £735 6s 8d from the merchants of Ypres. This was eventually paid in full in 1268-9 from the issues of the judicial eyre in Yorkshire (TNA E 372/114, r.11 m.1d). Again, in late 1268 the buyers of the wardrobe took goods worth £980 from the merchants of Douai and Ypres at London and at the fair of Bury St Edmunds. The royal letter obligatory recording this debt included the proviso that 'the said merchants be paid out of the first money coming to the Exchequer, notwithstanding any mandate [to make payments to anyone else] directed to the treasurer and chamberlains'. These measures seem to have been successful and, although the issue roll recording the payments made on this writ is damaged, it seems that at least £550 and very likely the whole of this obligation was paid (CLR 1267-1272, 60). In 1269, therefore, only £77 was owed to the Yprois on total advances of over £1,225, representing a 93.7% repayment rate. The Douaissiens, in a reversal of the situation before 1254, had probably received £790 on advances of £1,064, a repayment rate of 74.2%. After 1267, therefore, Henry III seems to have been reasonably successful in keeping up with repayments for current expenditure.

As in 1260, the English government had to offer incentives to the Flemings for the resumption of credit to the wardrobe. Part of this was a more credible commitment for repayment and, as described above, the merchants were given assignments with a high priority (second only to the king's Florentine creditors, CPR 1266-1272, 180, 182) and when they could be not satisfied from one source of revenue, Henry was quick to provide an alternative source. The king also rewarded the merchants with grants of trading rights. For example, on 30 June 1267, immediately after the resumption of the credit relationship with the Yprois, Henry had granted quittance from prise for one year to five important merchants of Ypres and he later granted simple protections for one year to two of these men (CPR 1266-1272, 174, 87). The other key issue was to deal with the arrears that had built up over the preceding twenty years. In December 1269, Henry made yet another attempt to rationalise his obligations to the merchants and to put in place an acceptable payment plan. The king recognised that he owed the merchants of Ypres £1,672 and the merchants of Douai £985 and he assigned this sum to be repaid from the issues of the next judicial eyre in Essex and Hertfordshire, and also Cambridgeshire, if necessary (CLR 1267-1272, 105-6; CPR 1266-1272, 398). This probably did not take effect, however, because it was interrupted by the outbreak of the Anglo-Flemish trade war in the following year. It is not clear exactly how this was repaid to the merchants, but later Edward I acknowledged debts of £1,267 to the merchants of Ypres and at least £465 to the Douaissiens (CPR 1272-1281, 265; TNA C 62/61 m.4). It therefore seems that Henry was making genuine attempts to repay the arrears owed to the Flemish merchants, but had failed to make significant headway, especially in the case of the Yprois.

The provision of credit to the wardrobe and the repayment of the accumulated arrears was finally interrupted by another exogenous shock; namely the Anglo-Flemish trade war of c.1270-1275 (Lloyd, 1977, 28-37). This has been linked to attacks on foreign merchants by the rebels during the period of civil war, but while there had been some disruption to trade between 1264 and 1267, there does not seem to have been any deliberate policy on the part of the king's opponents to target alien merchants. Moreover, as we have seen, after the restoration of order c.1267, the Flemish merchants had resumed supplies to the royal court, perhaps even on greater a scale than previously. The initial cause of the trade war may have been related to English attempts to impose the assize of cloth or to the failure of Henry III to pay the annual fee that the English kings had long promised to the rulers of Flanders. In June 1270 the countess of Flanders ordered the seizure of English goods in Flanders, later valued at £10,628. By September, the English authorities had retaliated, seizing Flemish goods (including debts owed to Flemings in England) subsequently said to be worth £5,872. The trade dispute was not resolved until 1275 and, naturally, the Flemish merchants ceased to extend credit to the wardrobe and the king did not pay any of the arrears owed to the Flemings. As a result, Henry III was again forced to return to the practice of the first half of his reign, and issue the buyers of the wardrobe with cash from the treasury in advance of the fairs, so that they could pay upfront for purchases rather than using credit (CLR 1267-1272). Even after the resumption of normal relations between England and Flanders, however, the Flemish merchants did not resume their previous role as direct suppliers of goods to the wardrobe on credit, as Edward I had now entered into a complicated financial arrangement with the Ricciardi of Lucca, who now acted as intermediaries in the king's dealings with other merchants.

There remained the question of the accumulated arrears owed to the Flemish merchants. At the same time as the wider Anglo-Flemish trade war was finally being resolved, Edward I re-opened the question of his father's debts to the merchants of Ypres. In Hilary term 1275, he ordered the barons of the Exchequer to search their records to find out how much had been paid to the Yprois and how much remained, and Edward subsequently authorised two small payments of £44 and £40 in favour of Jean Bardun of Ypres. These were described as being in part-payment of the debts owed to Bardun and his fellows of Ypres by Henry III, and the sums received were to be deducted from this debt (TNA C 62/51, m.6; E 403/30, m.1; E 403/1237, m.1; C 62/52, m.11; E 403/36, m.1; E 403/1239, m.1). This has the appearance of an annual payment, but at the rate of c.£80 per annum, however, the royal debt would not have been cleared until 1290. Instead, in June 1276, Edward took decisive action to resolve this long-running debt once and for all. He ordered his new Ricciardi bankers to pay £1,000 to Bardun, in return for the release of all Henry III's debts, later stated to be 1,900 marks (£1,266 13s 4d). Edward and his creditors had obviously reached an agreed settlement, whereby the merchants waived their claim to the full sum owed in return for rapid repayment (CPR 1272-1281, 169, 265, 278). The agreed figure of £1,000 represents a discount of 21% on the debts acknowledged in Edward's first letter of 1278. This was a much better deal than most other royal creditors received, possibly because the Yprois merchants had played a prominent role in the negotiations to resolve the Anglo-Flemish trade dispute, which may have given them the leverage they needed to deliver a favourable settlement of the king's debts to them. The Douaissiens, by contrast, did not reach a similar settlement with Edward; presumably they were still hoping to secure repayment in full. Although there is relatively little surviving information about the relationship between the king and the merchants of Douai after 1275, as late as 1285 and 1286 Edward was still making small payments to the Douaissiens towards a debt of £465 outstanding from Henry III's reign (TNA C 62/61 m.4; Wardrobe 1285-1286, 16, 50). In economic terms, it seems that, by accepting a relatively small discount in order to secure more rapid repayment, the Yprois may have made a wiser choice than the Douaissiens in holding out for payment in full.

4 The Model

To understand the decisions made by both parties we now develop a mathematical model of the trading relationship between the merchants and the king. The merchant has goods for sale and his goal is to maximise his profit from selling them. At the start of the trading year he chooses whether to export his goods to England or to another market, such as the fairs of Champagne. In the following analysis we focus on only one population of merchants, considering the merchants from Ypres and Douai as one homogeneous group.

Typically, in their dealings with the king, the ideal position for a merchant would be to trade in England but not to be chosen to provide cloth for the king on credit. The exception would be when the king's order of cloth produces a very high profit, provided that he subsequently repays a good part of his debt to the merchant. By contrast, the worst case would be when the king's order has a high potential profit, but he repays little or none of the debt. Indeed, this could bankrupt the merchant.

Thus, trading in England is a risky choice whose uncertainty increases with the potential expected return. For this reason it is natural to model the merchants' behaviour via decision analysis. Our aim is to model the proportion p_t of merchants choosing to trade in England in each year t as a rational response to the repayment pattern of the king and the risk/reward trade-offs from trading in England. To this end we model the kings repayment rate r_t in each year t as the single, driving stochastic factor in the model, and endow the merchants with a utility function.

4.1 The merchants' characteristics

At the start of each year, the merchants choose whether to trade England or elsewhere. We suppose that they are rational in the sense that they choose to journey to England if and only if the expected utility from doing so exceeds the expected utility from trading elsewhere. Further assuming that each merchant has the same, constant absolute risk aversion, we endow the representative merchant with an exponential utility, which takes the form

$$U(x_t) = -\gamma^{-1} e^{-\gamma x_t} \tag{1}$$

where γ is the coefficient of risk aversion, assumed to be constant over time, and x_t is the profit or loss made by the merchant during year t. For the exponential utility the certainty equivalent, i.e. the certain amount that yields the same utility as the expected utility of a gamble, is

$$CE(x_t) = -\gamma^{-1} \ln\left(-\gamma \mathrm{E}[U(x_t)]\right) \tag{2}$$

We choose to represent the merchant's preferences by (1) because this form of utility is particularly tractable. One useful and unique property is that the optimal (utility maximizing) decision is independent of initial wealth, so we can define our model in terms of the profit/loss in year t, rather than the total wealth of the merchant. However, note that the exponential is unique in this respect, and that any other utility function must be specified in terms of wealth. The extension to other forms of utility – e.g. with constant relative rather than absolute risk aversion – would be an interesting topic for further research.

The merchants are assumed to be homogeneous and so are equally likely to be chosen to trade with the king. The amount of cloth that the king purchased each year varied. In general, if the king wanted to purchase a greater amount of cloth, then he would probably look to a greater number of merchants to supply the greater volume (although his purchases might not have have been divided equally between them). This was probably particularly true for compulsory purchases as both royal mandates and the self-regulations of the Douai merchants envisage these prises being distributed between the merchants in some equitable manner – to try and reduce the burden of royal demands on any one merchant. We therefore suppose that the king trades with m_t merchants each year, and for simplicity we assume he demands the same value of cloth from each. Historical records indicate that m_t is likely to be small, e.g. 2 or 3. Now the probability q_t that a particular merchant is chosen to provide cloth to the king is given by

$$q_t = \frac{m_t}{Np_t}. \tag{3}$$

Here Np_t is the number of merchants trading in England in year t, where N is the total population size of the Ypres and Douai merchants combined, assumed constant, and p_t is the proportion of these merchants that trade in England in year t.

Our model aims to explain the dynamics of p_t. This will depend on the certainty equivalent of trading in England, relative to the certainty equivalent of trading outside England, with $p_{t+1} > p_t$ if the former is greater than the latter. The precise specification of the evolutionary dynamics for p_t depends on the factors affecting the merchant's decision and in particular the expected profits from trading in England. But this profit depends upon the king's demand for credit, the stochastic factor which drives all the other random variables, such as value of the debt accrued to date. Thus, in order to specify the evolution of p_t, we must first describe a model for the king's demand for credit and secondly use this to specify dynamics for the profits from trading in England.

4.2 The King's demand for credit

In order to capture the persistence of the king's tendency to repay (or not) over time, we define a process $\{R_t\}, t = 0, 1, 2, \ldots$ representing the king's repayment function. Here $0 \leq R_t \leq 1$, with $R_t = 0$ representing that the king pays the merchant nothing for the cloth he receives and $R_t = 1$ representing that the king pays his debt in full. We assume that the function follows a Markov process with transition probability π as follows: let $U_t \sim B(\alpha, \beta)$ be an independent identically distributed (i.i.d.) process on a beta random variable, for $t = 0, 1, 2, \ldots$, which has density function

$$f(u; \alpha, \beta) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)}\, u^{\alpha-1}(1-u)^{\beta-1},$$

where $\Gamma(.)$ is the gamma function. Note that this distribution has domain [0,1] and mean $\alpha/(\alpha + \beta)$.

Now set $R_0 = u_0$, and for $t > 0$ set $R_t = R_{t-1}$ with probability π and $R_t = u_t$ otherwise. This introduces a stickiness in the repayment rate from the king by controlling the value of π, with $0 \leq \pi \leq 1$. As π increases, the king's behaviour becomes more reliable and thus easier for the merchants to predict. By altering α and β we model different repayment scenarios, e.g.: if $\alpha = 4$ and $\beta = 1$ the density above has mean 0.8, i.e. the expected repayment from the king is 80% of his debt; if $\alpha = \beta = 2$ the expected repayment from the king is 50% of his debt; and if $\alpha = 1$ and $\beta = 4$ the expected repayment from the king is 20% of his debt.

4.3 Trading profits

For simplicity we assume that each merchant has one unit of cloth for sale each year. The annual profit, x^o, from trading this cloth outside England is assumed constant over time. Denote by x_t^e the annual profit from trading in England during year t in the absence of any requirement to provide cloth for the king. This includes both the profit margin on selling all his goods to private customers at the market price (ignoring any private credit advanced for expected default or late payment rates) and the additional profit accrued by investing that income in buying wool and exporting that back to Flanders. Given the characteristics of the English wool trade at this time, the potential profit from trading in England should be greater than that of trading at the fairs of Champagne or elsewhere. However, the extra profit will be eroded by competition as the number of merchants trading in England increases.

We therefore capture the advantage from trading in England, in the absence of any requirement to provide cloth for the king, by setting

$$x_t^n = x^o + \left(\frac{p_0}{p_t}\right) x^a, \quad N_t^e > 0, \tag{4}$$

for some initial advantage $x^a > 0$ and initial proportion $p_0 > 0$ of merchants trading in England. We assume that the cost of producing cloth is constant, c, so that the revenue from trading in England, in the absence of any requirement to provide cloth for the king, would be given by $r_t^n = x_t^n + c$.

Now consider how profits evolve when we introduce a requirement that some merchants provide cloth to the king. Based on historical observations we make three assumptions so that the model does not become too complex: 1) if a merchant is chosen to trade with the king then he does not trade his cloth elsewhere on the English markets; 2) if he is owed money from trading cloth with the king in year $t-1$, the only chance he has of being repaid is by coming to England in year t and again being chosen to trade with the king. In that case this debt is paid in full, otherwise the merchant writes off his debt, setting it to zero for the following year; 3) the king trades a fixed amount of cloth with each merchant and the price that is agreed between the king and the merchant is at a constant premium $x > 0$ above r_t^n, i.e. the revenue from trading with the king, if he pays in full, is $x + x_t^n + c$.

We may now specify the profit function from trading in England. If the merchant is chosen to trade with the king his profit is:

$$x_t^k = R_t\left(x + x_t^n + c\right) + d_{t-1} - c, \tag{5}$$

where d_{t-1} is the debt accrued to the merchant from trading with the king in year $t-1$. The king's goal is to obtain as much cloth on credit from the merchants as possible while paying as little as possible at the due term, without causing the merchants to boycott England. The stochastic repayment from the king makes both x_t^k and d_t stochastic. Following assumption 2 above we have, for $t = 1, 2, \ldots$:

$$d_t = \begin{cases} (1 - R_t)(x + x_t^e + c) & \text{with probability } p_t q_t, \\ 0 & \text{otherwise.} \end{cases} \tag{6}$$

4.4 Evolutionary dynamics for p_t

The utility value of trading outside England is $U^o = U(x^o)$, based on the constant profit x^o. However, if the merchant chooses to trade in England then the outcome is uncertain and so we compute the expected utility:

$$\mathrm{E}[U_t^e] = q_t \mathrm{E}[U(x_t^k)] + (1 - q_t) U(x_t^n), \tag{7}$$

with q_t, x_t^n and x_t^k given by (3), (4) and (5), respectively. This expected utility is simply a weighted average of the expected utility from trading in England if chosen to trade with the king and the expected utility from trading in England but not with the king.

Finally, assuming that the merchants behave rationally, we employ the replicator dynamics introduced by Maynard Smith and Price (1973) and Taylor and Jonker (1978), here based on the certainty equivalent function. This specifies the evolution of the proportion p_t of merchants that choose to trade in England as:

$$p_{t+1} = \frac{p_t \, CE_t^e}{p_t \, CE_t^e + (1 - p_t) CE_t^o} \tag{8}$$

with $CE_t^e = -\gamma^{-1} \ln(-\gamma \mathrm{E}[U_t^e])$ and $CE_t^o = x^o$ since the profit from trading outside is not assumed to be random. Finally, we set $p_t = 0$ if $N_t^e = 0$, i.e. no merchants choose to trade in England.

5 Simulations

Simulations demonstrate how the proportion p_t of merchants trading in England is affected by the model parameters. We shall illustrate how the merchant's coefficient of risk aversion, γ and the parameters α and β of the king's repayment rate influence the evolution of p_t, based on the evolutionary dynamic (8), using a single simulation of random numbers for generating the i.i.d. beta random variables $B(\alpha, \beta)$ which determine the stochastic repayment rate, R_t, of the king, starting with $R_0 = 0.5$. We draw 50 random numbers in the sample to simulate 50 years of interaction between the merchants and the king.

The results depend on q_t, the probability of trading with with the king, and this depends on N_0, the initial size of the merchant population, the profit x^o from trading outside England, the initial advantage x^a of going to England, the number of merchants m chosen to trade with the king, the premium x when the cloth is traded with the king and the cost c of producing and transporting the cloth. By changing these initial values and constants, and by changing the parameters α, β and γ we can witness quite different evolutions for the proportion of merchants that choose to trade in England.

To demonstrate how the model can be applied, Table 5 shows four possible combinations of parameters. There are obviously numerous ways in which the parameters of the model could be varied in addition to the simulations discussed below, which are just used as exemplars to focus on the effects of α, β and γ on the proportion of merchants trading in England. For the rest of the parameters we choose values that seem reasonable given the historical data. For instance, we keep π constant at 0.75, so the king's repayment rate can vary considerably at some times and be more persistent at others. The initial advantage x_0^a from trading in England is also kept constant, at 10%, based on the greater profitability of exporting wool back to Flanders drawing upon the Douai price schedule of c.1270 (Monroe, 1978, 125). From the royal records, the king usually trades with either one or three merchants per year. The initial number of merchants trading in England can be 20 or 50, depending on the values chosen for p_0 and N_0. These assumptions are based on the estimate for the total number of Merchant-drapers in Douai by Espinas (1913, II, 699-700) and the comprehensive lists for Douaissien Merchants active in England in 1247 and c. 1270 (CPR 1247-1258, 17; TNA E101/127/3). We then extrapolate figures for Ypres, which was an industrial centre of equivalent size to Douai, but sources indicate that only half as many Yprois as Douaissiens were active in England (Moore, 1985, 70).

Figures 2 – 5 depict the evolution of p (left scale) and R (right scale) corresponding to the four sets of parameters shown in Table 5. Figure 2 is based on the parameters given in the second column of Table 5 (headed Simulation 1). Here there is a gradual increase over time in the proportion of merchants trading in England from the initial value of 20% to around 90% after 50 years. With $\alpha = 4$ and $\beta = 1$ the king usually pays nearly in full, giving the merchants a good profit. In this case, the repayment profile is relatively high and constant, apart from the drop to around 60% that occurs roughly half way through the simulated period. The willingness of the merchants to trade in England in increasing numbers over time arises as a result of the king's tendency to pay most of what is due immediately and occurs despite both the merchants' moderate degree of risk aversion ($\gamma = 4$) in this case and the reduction in profitability that arises as more merchants in England implies more competition.

Figure 3 plots the profiles of p and R over time again, with identical parameters except that the coefficient of risk aversion has been reduced from four to one (Simulation 2 in Table 5), and the initial proportion of merchants in England is set higher (p_0 is set at 0.5 now compared with 0.2 previously). Moreover, the parameters of the beta distribution have also been reversed so that now $\alpha = 4$ and $\beta = 1$, which implies that the expected debt repayment is reduced from 80% previously to 20% now. In this case, despite the merchants being much less risk averse (with $\gamma = 1$) the king is only paying around a quarter of what is owed each year for the first 15 years, and this is insufficient to encourage the merchants to remain in England. Thus, p falls from its initial value of 20% to zero by that time. A rise in the King's repayment rate of around 50% is enough to entice around a quarter of the merchants back within a decade. But when the repayment rate plummets to 5% thereafter, all the merchants leave within three years never to return by the end of our simulation period.

The profiles of p and R are graphed for Simulation 3 (see Table 5) in Figure 4. The parameters in this case are set identically to those of the base case (Simulation 1), except that the parameters of the beta distribution have been modified again so that now $\alpha = 2$ and $\beta = 2$, corresponding to a moderate degree of repayment. In this case, the initial proportion of merchants in England remains stable for the first fifteen years or so, but rises steadily thereafter to 50% following an increase in the King's payment of dues from 60% to almost 90%. However, the proportion of merchants in England falls sharply to zero a couple of years after the repayment rate falls to 30%, which is too much for these fairly risk averse merchants to bear.

The final plot, Figure 5 (Simulation 4 in Table 5) employs identical parameters to that of Figure 4, including an identical repayment function, except that the merchants are now less risk averse ($\gamma = 1$ here rather than 4). The dynamic profile of repayments is of course exactly the same as that of Figure 4, but now the merchants feel less concerned about the risk of not being paid for providing cloth to the King. The result is that the proportion of merchants rises from the same initial 20% to reach 75% after around 25 years. But even these more risk tolerant merchants eventually give up and all go home following the fall in the repayment rate to 30%, although the drop out takes an additional four years to take place.

6 Conclusions

This paper has developed a model to capture the evolutionary dynamics of the interactions between Flemish merchants and the king of England during the period 1247–1270. We are able to demonstrate that mathematical modelling can be used to simulate the economic decisions and interactions between medieval merchants and their royal customers. Having established this principle, the model is used to address questions regarding behaviour that otherwise seem inexplicable. For instance, why would merchants continue to trade in England and lend to the King despite having appeared to have suffered previous losses from doing so?

To summarise the merchants' decision making process, if they believe that the king's credit rating is good and therefore they will receive a large proportion of the agreed price on time, or that the royal demands for goods will be limited compared to the numbers of merchants active in England (so any expected losses from the king requesting goods or taking goods as prise and then deferring repayment will be modest), then they will be happy to trade in England. However, should the merchants expect that either the king will only pay for these goods after a long delay, if at all and/or that there is a high chance that the king will request/compulsorily purchase a high proportion of their goods, then their losses on advances to the king could increase to the point where they prefer to boycott England and trade in another market. This can be seen as an endogenously-determined credit strike, and the merchants of Ypres seem to have made this decision in 1254.

We are able to simulate the profile of the number of merchants trading in England for various combinations of model parameters and to show which factors have the greatest impact on their choice of whether to trade in England or elsewhere. The most critical parameters relate to the merchant's degree of risk aversion, the probability of trading with the king and the likelihood of making a loss if selected. Increasing any of these factors will increase the likelihood of a credit strike in our model.

References

[1] CCR *Close Rolls of the reign of Henry III Preserved in the Public Record Office* (15 vols, London, 1902-75).

[2] CFR *Calendar of the Fine Rolls of the Reign of Henry III* both available on the Henry III Fine Rolls Project's website (http://www.finerollshenry3.org.uk)

[3] CLR *Calendar of the Liberate Rolls preserved in the Public Record Office* (6 vols, London, 1916-64).

[4] CPR *Calendar of Patent Rolls of the reign of Henry III Preserved in the Public Record Office* (6 vols, London, 1901-13).

[5] Wardrobe 1285-1286 *Records of the wardrobe and household, 1285-1286*, eds. B. F. Byerley and C. Byerley (London, 1977).

[6] A. R. Bell, C. Brooks and T. K. Moore (2009), 'Interest in medieval accounts: examples from England, 1272-1340', *History*, 94, 411-33.

[7] D. A. Carpenter, 'What Happened in 1258?', *War and government in the Middle Ages: essays in honour of J. O. Prestwich*, ed. J. Gillingham and J. C. Holt (Woodbrodge, 1984), 106-19 and reprinted in his *Reign of Henry III* (London, 1996), 183-97.

[8] D. A. Carpenter (1985), 'King, magnates and society: the personal rule of Henry III, 1234-1258', *Speculum*, 60, 39-70 and reprinted in his *Reign of Henry III*, 75-106.

[9] R. Cassidy (2011), 'Adventus Vicecomitum and the Financial Crisis of Henry III's Reign, 1250–1272', *English Historical Review*, 126, 614-27.

[10] P. Chorley (1987), 'The cloth exports of Flanders and northern France during the thirteenth century: a luxury trade?, *The Economic History Review*, 40, 349–379.

[11] M. T. Clanchy (1993), *From memory to written record: England, 1066-1307* (2nd ed., London).

[12] G. Espinas (1913), *La vie urbaine de Douai au Moyen Age* (4 vols, Paris).

[13] A. Grief, P. Milgrom and B. R. Weingast, (1994), 'Coordination, commitment and enforcement: the case of the merchant guild', *Journal of Political Economy*, 102, 745-76.

[14] J. C. Holt (1992), *Magna Carta* (2nd ed., London).

[15] M. Howell (2001), *Eleanor of Provence: queenship in thirteenth-century England* (Oxford)

[16] R. W. Kaeuper (1973), *Bankers to the Crown: Edward I and the Ricciardi of Lucca* (Princeton).

[17] C. H. Knowles (1982), 'The resettlement of England after the barons' war, 1264–67', *Transactions of the Royal Historical Society*, 5th series 32, 25–41.

[18] T. H. Lloyd (1977), *The English wool trade in the Middle Ages* (Cambridge).

[19] J. R. Maddicott (1994), *Simon de Montfort* (Cambridge)

[20] E. Weidermayer Moore (1985), *The fairs of medieval England: an introductory study* (Toronto).

[21] J. Maynard Smith and G. R. Price (1973), 'The Logic of Animal Conflict,' *Nature*, 246, 15-18.

[22] J. H. Munro (1978), 'Wool-price schedules and the qualities of English wools in the later Middle Ages', *Textile History*, 9, 118-69.

[23] J. H. Munro (1983), 'The Medieval Scarlet and the Economics of Sartorial Splendour,' in N. B. Harte and K. G. Ponting, eds., *Cloth and Clothing in Medieval Europe: Essays in Memory of Professor E. M. Carus-Wilson*, Pasold Studies in Textile History, 2 (London), 13-70.

[24] W. M. Ormrod, M. Bonney and R. Bonney (1999), *Crises, revolutions and self-sustained growth: essays in European fiscal history, 1130-1830* (Stamford).

[25] H. W. Ridgeway (1989), 'Henry III and his Problems of Patronage, 1247-1258', *English Historical Review*, 104, 590-610.

[26] G.Sayles (1931), ‘A dealer in wardrobe bills’, *Economic History Review*, 3, 268-73.

[27] R. C. Stacey (1987), *Politics, policy and finance under Henry III, 1216-1245* (Oxford)

[28] A.Steel (1929), ‘The negotiation of wardrobe debentures in the fourteenth century’, *English Historical Review*, 44, 439-43.

[29] P.D. Taylor and L. Jonker (1978), ’Evolutionarily Stable Strategies and Game Dynamics’, *Mathematical Biosciences*, 40, 145-156.

[30] T. F. Tout (1920-33), Chapters in the Administrative History of Medieval England (6 vols, Manchester).

[31] R. F. Treharne (1971), *The Baronial Plan of Reform, 1258-1263* (2nd ed., Manchester).

[32] R. F. Treharne and I. J. Sanders (1973), *Documents of the baronial movement of reform and rebellion, 1258-1267* (Oxford).

[33] M. Vale (2004), *The princely court: medieval courts and culture in north-west Europe, 1270-1380* (Oxford)

[34] B. L. Wild, ‘Secrecy, splendour and statecraft: the jewel accounts of King Henry III of England, 1216–72’, *Historical Research*, 83, 409-30.

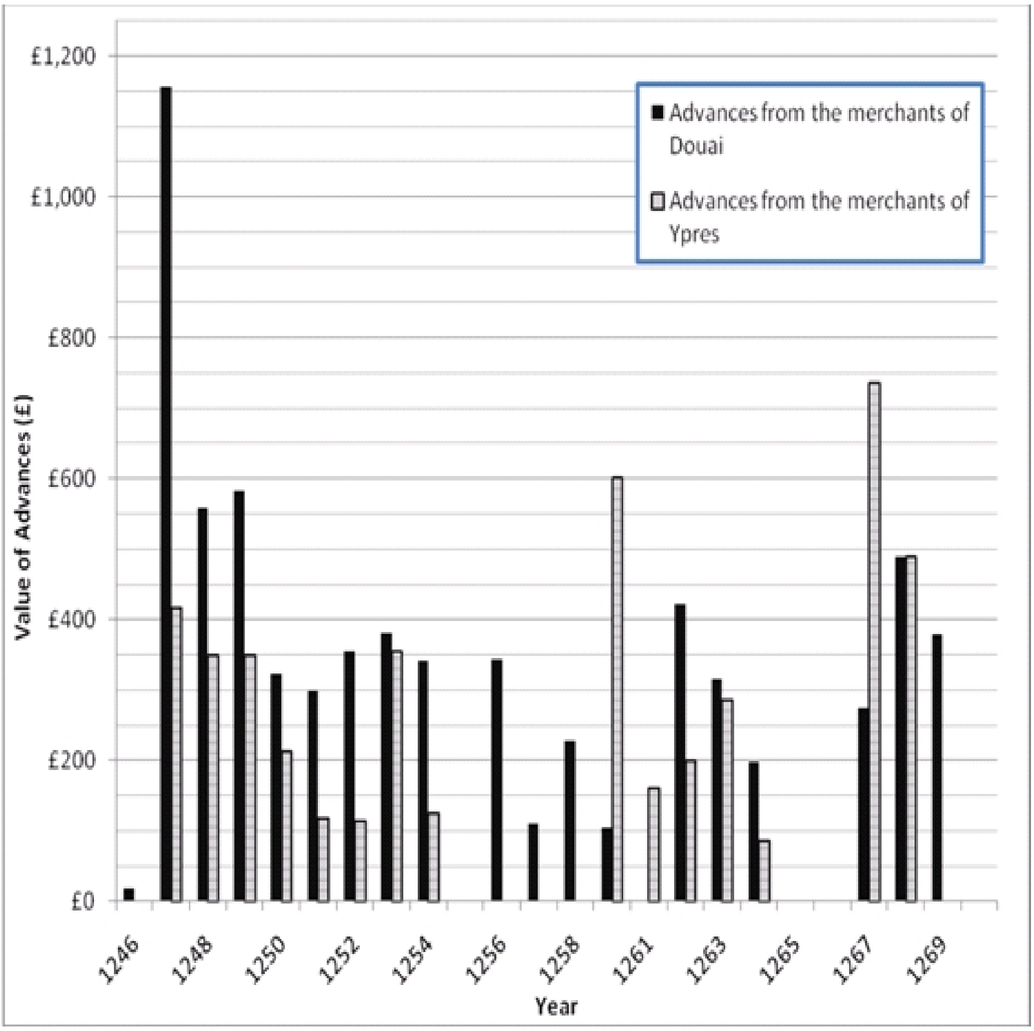

Figure 1: Provisions of cloth on credit to the king by the merchants of Douai and Ypres

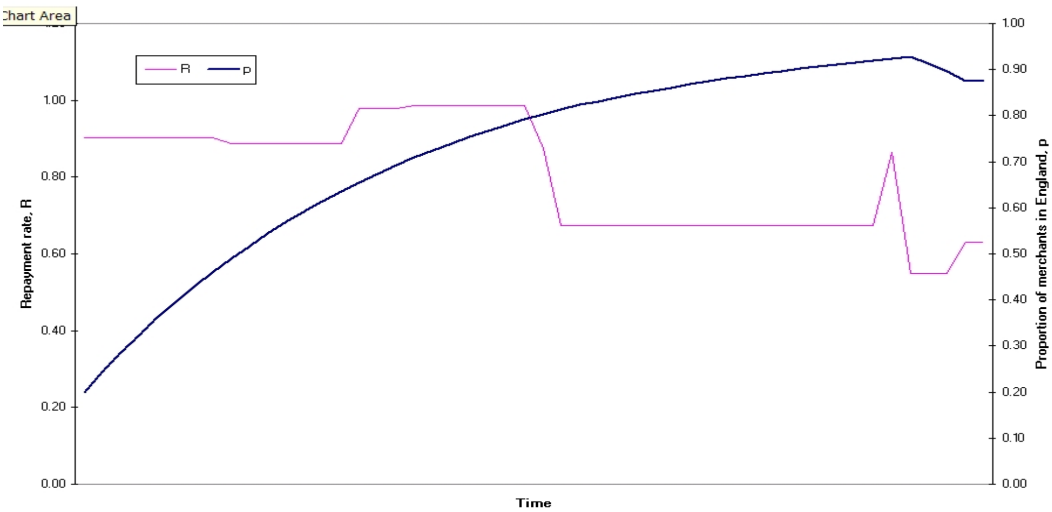

Figure 2: Path of p_t and of r_t for 50 Years using Simulation 1 in Table 5

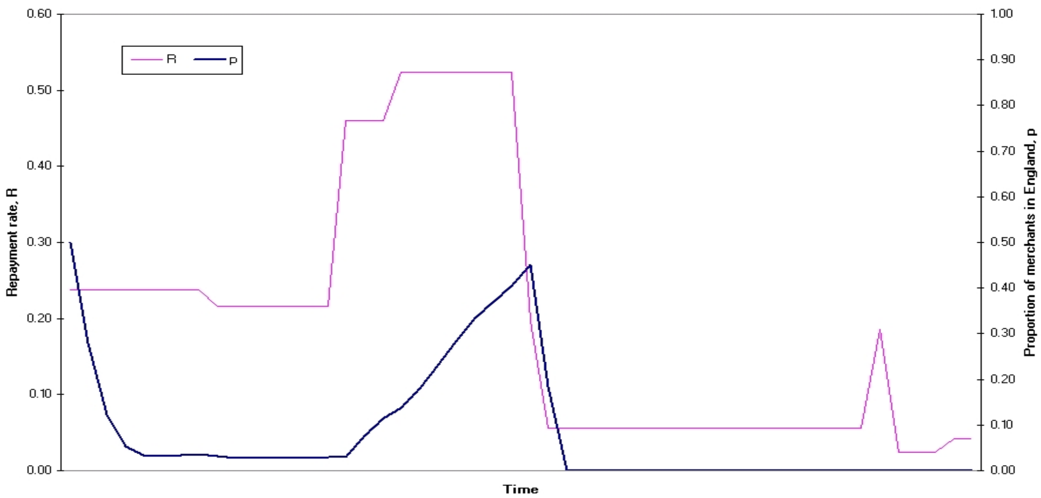

Figure 3: Path of p_t and of r_t for 50 Years using Simulation 2 in Table 5

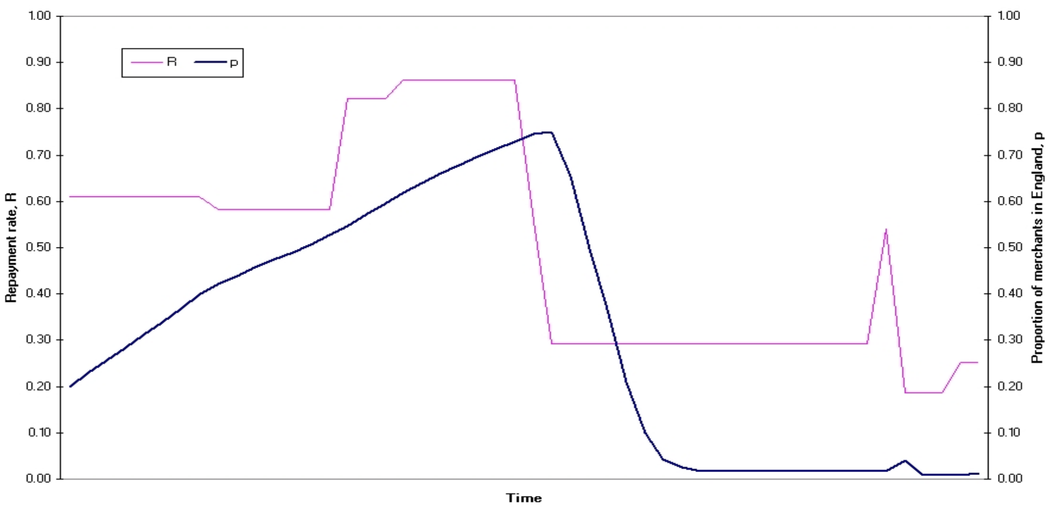

Figure 4: Path of p_t and of r_t for 50 Years using Simulation 3 in Table 5

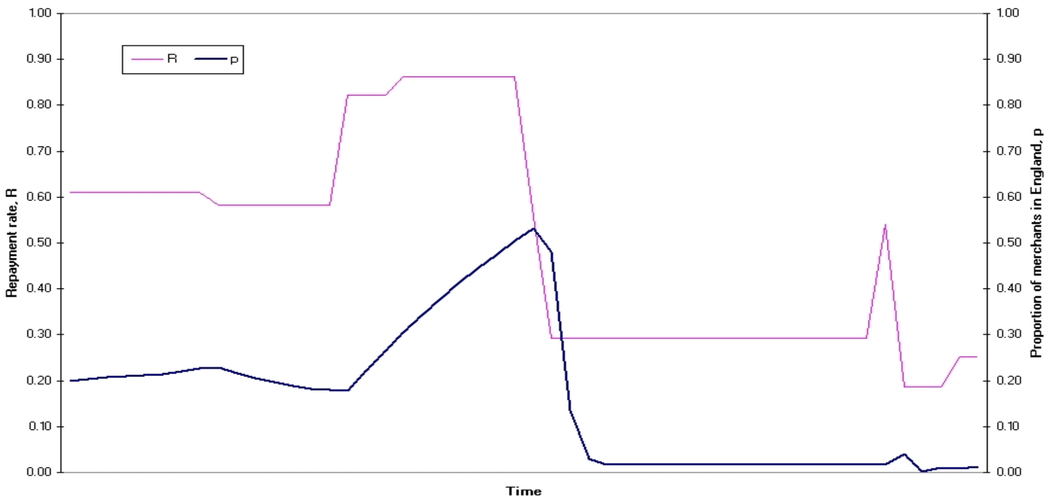

Figure 5: Path of p_t and of r_t for 50 Years using Simulation 4 in Table 5

Table 1: **Transactions between Merchants of Douai and Henry III**

Reference	Document date	Transaction year	Value	Description
CLR 1245-1251 p.91	5/11/1246	1246	£18	Purchase of cloth from John Bataill of Douai
CLR 1245-1251 p.163	20/1/1248	1246x1248	£1155 18s 2d	Purchase of cloth 31/32H3
CLR 1245-1251 p.249	8/11/1249	1248x1249	£1117 8s 6d	Purchase of cloth at divers fairs
CLR 1245-1251 p.273	19/1/1250	1249	£23 18s 7d	Purchase of cloth at St Ives
CLR 1245-1251 p.328	20/1/1251	1250	£323 14s 4d	For cloths bought October 1249 – 22 January 1251
CLR 1251-1260 p.47	16/5/1252	1251	£298 2s 4d	for cloths bought at Stamford, St Ives and Boston
CLR 1251-1260 p.47	16/5/1252	1252	£354 9s 0d	For cloths bought at Stamford and St Ives
CLR 1251-1260 p.153	6/12/1253	1253	£112 11s 3d	For cloths bought from Nicholas de Lyons and others at Boston
CLR 1251-1260 p.153	6/12/1253	1253	£45 5s 5d	For cloth bought from Andrew Alain of Douai
CLR 1251-1260 p.174	22/7/1254	1254	£89 12s 0d	Purchase of 40 cloths at Stamford
CLR 1251-1260 p.174	22/7/1254	1254	£62 6s 8d	For 25 cloths bought at London
CLR 1251-1260 p.192	19/1/1255	1254	£75 4s 2d	Prise of cloths at Northampton and Bury St Edmunds
CLR 1251-1260 p.192	19/1/1255	1254	£114 0s 8d	Prise of cloths at Northampton and Bury St Edmunds
CLR 1251-1260 p.416	23/12/1257	1256	£115 2s 8d	Prise of cloths at Boston
CLR 1251-1260 p.416	23/12/1257	1256	£227 18s 4d	Prise of cloths at St Ives
CLR 1251-1260 p.438	4/11/1258	1257	£56 16s 8d	Prise of cloths at Bury St Edmunds
CLR 1251-1260 p.416	23/12/1257	1257	£54 8s 2d	Prise of cloths at St Ives
CLR 1251-1260 p.438	4/11/1258	1258	£226 13s 4d	Prise of cloths at St Ives
CPR 1258-1266, p.69	14/5/1260	1260	£105 0s 12d	Prise of cloths at St Ives
CPR 1258-1266, p.213-14	26/5/1262	1262	£200	Purchase of cloths from the merchants of Douai, Ypres and Lucca at St Ives
CPR 1258-1266 p.251	8/3/1263	1262	£221 18s 0d	Purchase of cloths at Winchester and Bury St Edmunds
CPR 1258-1266 p.303	18/12/1263	1263	£255 8s 8d	Purchase of cloths at Bury St Edmunds
CPR 1266-1272 p.181	12/1/1268	1263	£60 14s 4d	Prise of 14 cloths from Nicholas de Lyons at St Ives
CPR 1258-1266, p.162	8/2/1265	1264	£76 17s 8d	Purchase of cloths at Whitsuntide
CPR 1258-1266 p.385	4/11/1264	1264	£120 7s 10d	Prise of cloths at London against Christmas
CPR 1266-1272 p.393	16/11/1268	1266	£274 3s 4d	Prise of cloths at Northampton
CPR 1266-1272, p.310	10/1/1269	1268	£490	Prise of bread, fur, wax, spices and other necessaries from the merchants of Douai and Ypres at London and at Bury St Edmunds
CLR 1267-1272 p.82	21/5/1269	1269	£380	Prise of cloths at St Ives

Table 2: **Transactions between Merchants of Ypres and Henry III**

Reference	Document date	Transaction year	Value	Description
CPR 1247-1258, p.7	29/1/1248	1246x1248	£416 2s 6d	Purchase of cloths at divers fairs in England
CLR 1245-1251, p.284	27/4/1250		£699 19s 2d	Purchase of cloths at divers fairs in England
Ibid, p.328	20/1/1251	1249x1250	£212 16s 8d	Purchase of cloths October 1249 – 22 January 1251
Ibid, p.385	26/10/1251	1250x1251	£116 17s 8d	Purchase of cloths at the fairs of Bury St Edmunds and Boston
CLR 1251-1260, p.47	16/5/1252	1251x1252	£113 18s	Purchase of cloths at the fairs of Stamford and St Ives 1251-1252
Ibid, p.128	15/5/1253	1252x1253	£270 2s 8d	Purchase of cloths at the fairs of Northampton, Stamford and St Ives 1252-1253
Ibid, p.174	22/7/1254	1254	£57 4s 4d	Purchase of 25 rayed cloths from John Potekin of Ypres and his fellows at Stamford fair
Ibid, pp.192, 449-50	19/1/1255	1254	£68 4s 8d	Prise of cloths at the fairs of Northampton and Bury St Edmunds 1254
CPR 1258-1266, p.121	20/4/1260	1260	£500	Loan from the echevins and merchants of Ypres
Ibid, p.69	14/5/1260	1260	£100 24s 8d	Prise of cloths at the fair of St Ives 1260
Ibid, p.251	8/3/1263	1261	£159 12s 4d	Prise of cloths at the fairs of St Ives and Bury St Edmunds 1261
Ibid, pp.213-14	26/5/1262	1262	£200	Purchase of cloths from the merchants of Douai, Ypres and Lucca at the fair of St Ives 1262
Ibid, p.304	24/12/1263	1263	£285 6s 9d	For cloths taken at Bury St Edmunds fair 1263
CLR 1260-1267, p.164	15/2/1265	1264	£85 6s 8d	For cloths taken at Boston Fair 1264
CPR 1266-1272, pp.86-8, 231; CLR 1267-1272, p.87	24/5/1268	1267	£735 6s 8d	For a loan and for cloths taken by Ewell in Flanders, May-June 1267
CPR 1266-1272, p.310; CLR 1267-1272, p.60	10/1/1269	1268	£490	Prise of bread, furs, wax, spices and other necessaries from the merchants of Douai and Ypres in London and at Bury St Edmunds (1268)

Table 3: **Henry's credit history**

			Merchants of Douai			Merchants of Ypres		
Official	Date range	Purchases	Arrears	% arrears	Purchases	Arrears	% arrears
Roger the Tailor	1243 – 1257	£3,733	£1,014	27.2%	£2,038	£1,031	50.5%
Roger the Tailor	1255 – 1257	£678	£448	66.1%			
Peter des Rivaux	27/9/1257 – 8/7/1258	£284	£284	100%			
Aubrey de Fecamp and Peter of Winchester	8/7/1258 – 26/7/1261	£105	£0	0%	$\leq$ £681	£105	15.4%
Henry de Ghent	26/7/1261 – 1/1/1265	£935	£488	52.2%	£659	£459	70.4%
Nicholas of Lewknor	7/8/1265 – 3/3/1268	£274	£274	100%	£735	£77	10.5%
Peter of Winchester	4/3/1268 – 20/11/1272	£870			£490		
TOTAL		£6,879	£2,506(£1,064)	36.9%(15.3%)	£5,502	£1,672	30.4%

Notes: The figure of £681 divides the £159-worth of goods provided to the wardrobe at St Ives in April 1261 and Bury St Edmunds in November 1261 equally between the accounting periods of Fecamp/Winchester and Ghent. The figure of £659 for Henry de Ghent assumes that they contributed one-third of the £600-worth of goods provided to the wardrobe in 1261 by the merchants of Douai, Lucca and Ypres. The figure of £870 for Peter of Winchester assumes that they contributed half of the £980-worth of goods supplied to the wardrobe by the merchants of Douai and Ypres in 1268. Where two figures are supplied in the totals, the former value assumes that none of the pre-1257 arrears had been repaid by 1270, while the latter value (in parentheses) assumes that these early arrears had been repaid.

Table 4: **Wardrobe 'Overdrafts'**

Keeper	Reference	Period	Receipts	Expenses	*Superplusagium*	% Overdrawn	Cloth
Chaceporc	TNA E 372/95, r.7	24/6/1245-18/2/1252	£66,240	£68,930	£2,690	4.10%	£3,848
Chaceporc	TNA E 372/96, r.5d	18/2/1252-27/10/1252	£6,504	£5,314	+£1,190 8s 5d	22.40%	-
St-Romain	TNA E 372/99, r.15	10/1/1255-29/4/1256	£16,316	£16,344	£28	0.00%	£1,665
Rivaux	CCR 1264-1268, 421-22.	29/9/1257-7/7/1258	-	-	-	-	£1,937
Fecamp and Winchester	TNA E 361/1, r.2	8/7/1258-25/7/1261	£39,422	£39,572	£150	0.40%	£6,322
Ghent	TNA E 372/113, r.2	26/8/1261-31/12/1264	£37,265	£40,776	£3,511	9.40%	£4,018
Sandwich	TNA E 372/114, r.19	3/4/1265-6/8/1265	£2,754	£3,498	£744	27.00%	£484
Lewknor	TNA E 372/115, r.1	7/8/1265-3/3/1268	£28,081	£32,801	£4,720	16.80%	£3,276
Winchester	TNA E 372/116, r.1	4/3/1268-19/11/1272	£37,762	£42,823	£5,061	13.40%	-

Table 5: **Parameter Values Employed for Simulation Examples**

Parameter	**Simulation 1**	**Simulation 2**	**Simulation 3**	**Simulation 4**
Parameters relating to the merchants				
Initial Population Size, N_0	100	100	100	100
Initial Proportion, p_0	0.2	0.5	0.2	0.2
Cost of Cloth, C	5	5	5	5
Profit(Outside), x^o	7	7	7	7
Initial Advantage, x_0^a	2	2	2	2
Risk Aversion, γ	4	1	4	1
Parameters relating to the King				
Premium from trading with the King, x	5	5	5	5
α	4	1	2	2
β	1	4	2	2
Transition Prob for R, π	0.75	0.75	0.75	0.75