RISK INSTRUMENTS IN THE MEDIEVAL AND EARLY MODERN ECONOMY*

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ABSTRACT: This paper describes the evolution of financial risk instruments in Europe before 1600. It discusses the evolution of marine insurance and its displacement of the sea loan, as well as early examples of forward transactions, options, and futures contracts. In contrast to business, households had only limited access to financial risk instruments–mainly in the form of life-contingent annuities.

JEL Categories: G2, G22, N23

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PREFACE

There are two classes of question one might ask about financial systems. The first and broader class relates to their role in the economy: What is their contribution to economic development and growth? What is their impact on the way business is organized? On the organization and behavior of government? The second and narrower class of question relates to financial systems themselves: What is their economic function? How do they evolve? What are the causes and consequences of financial innovation?

History is perhaps the most promising source of answers to both classes of question. This paper is a draft chapter in a planned work that draws on the economic and financial history of the period to 1600. The section of the work to which this chapter belongs focuses on the narrower class of question about the financial system itself during this period. Other sections will take up the broader class of question. Draft chapters of this section are available as the following working papers[1]:

1. Finance before the Industrial Revolution: An introduction
2. Medieval and early modern coinage and its problems
3. Early deposit banking
4. Bills of exchange and the money market to 1600
5. Merchant banking in the medieval and early modern economy
6. The capital market before 1600
7. Risk instruments in the medieval and early modern economy

The financial system is part of the institutional structure that facilitates economic transactions. Specifically, the financial system facilitates lending, payments, and trade in risk. While lending often steals the limelight, the role of the financial system in facilitating payments and trade in risk is no less essential. Before 1600, because of the poor quality and inadequate quantity of coin, the payments function was particularly important (Paper 2 discusses the problems of the coinage in this period). As commerce expanded, the pressing need for adequate means of payment prompted a great deal of financial innovation–in particular, the emergence of the deposit bank and the bill of exchange. The deposit bank (Paper 3) provided a means of payment–the transfer of deposits–that minimized the need to use actual cash. The bill of exchange (Paper 4) provided a means of remittance–of transferring funds from one place to another–without

[1]Copies may be downloaded from: http://www.dartmouth.edu/~mkohn

having to ship specie or bullion. The bill of exchange was also an instrument of credit, the basis on which merchant banks built an efficient international system of commercial credit (Paper 5). While the bill of exchange satisfied the need for short-term finance, the growing need for long-term finance was met by a developing capital market (Paper 6). Trade in risk was still in its infancy, but the period saw the development of marine insurance and the beginnings of futures and options (the current paper). Paper 1 provides some general background on saving and investment during the period, on the effects of the prohibition of usury, and on the extensive system of 'informal' finance', out of which specialized financial institutions and markets evolved.

INTRODUCTION

In the Middle Ages, the world was a far more dangerous place than it is today. If natural disasters were no more common, vulnerability to them was far greater. Poverty, primitive technology, and rudimentary markets made famine a common occurrence. Flimsy houses and ships were hostage to the elements. Plagues and infection wiped out millions. Yet more dangerous than Nature was Man himself: warfare, piracy, and brigandage all took a heavy toll. For businesses and for households, providing against these dangers, to the extent possible, was a vital necessity.

BUSINESS RISKS

Business faced two broad categories of risk–casualty risk and market risk. Casualty risk included the hazards of Nature and Man. Overseas commerce was particularly dangerous. Shipwreck was common: ships were none too sturdily built and often foundered in a storm; sailing ships were liable to be driven onto a lee shore. With beacons, lighthouses, and buoys a rarity, and navigation far from accurate, accidental groundings were common. Grounded ships were routinely plundered by the locals. At sea, ships and cargoes might be taken by pirates and privateers; in port, they might be seized by belligerent states or corrupt officials. Overland trade, too, was not without its risks: instead of pirates and privateers, there were foraging armies and brigands–often in the form of local lords demanding ‘tolls’ for safe passage.

Market risk–the risk of loss from adverse movements of market prices–was far greater than it is today. Almost all commerce was venturing–the sending of goods to distant markets to be sold there at an uncertain price; shipping to order was virtually unknown. Prices fluctuated widely: demand was often inelastic, and supply irregular. High transportation and transactions costs meant that markets were fragmented and therefore thin. A ship might arrive in port to find the market eager for its cargo, or, equally likely, to find another ship recently arrived with similar cargo and the market saturated. Because both information and goods traveled slowly, market conditions changed much faster than merchants were able to react to them.

Businesses could respond to these risks in two ways–internally, by adapting to them, or externally, by entering into arrangements with others to mitigate them. Merchants adapted to casualty risk by avoiding dangerous routes, by arming themselves, and by dividing their cargoes among several vessels. They adapted to market risk by gathering the best market intelligence available and by diversifying across goods and markets. The arrangements merchants made with others to mitigate risk were both financial and non-financial. The non-financial arrangements included mutual defense–convoys and

caravans–and the pooling of goods to be sold ‘in joint stock’. The financial arrangements were instruments of various types that shifted certain risks to others who were willing to bear them for a consideration. We focus here on these financial arrangements.

The most general financial instrument of risk is equity finance. Equity finance–in the form of the *commenda* or of the share company–was common in commerce and shipping.[2] Since the return to equity investors is a *pro rata* share of the profits, they also bear a *pro rata* share of all the risks to which a business is exposed. The bearing of this risk is made easier by dividing the equity into fractions that are small relative to the total wealth of an individual investor. It is also made easier if individual investors can protect themselves through diversification–taking stakes in many unrelated enterprises. The problem with equity as a device for bearing risk is that it exposes investors not only to external hazards–casualty and market risk–but also to hazards that are internal to the enterprise–to the incompetence or dishonesty of associates, employees, or agents. To protect themselves against these internal hazards, equity investors had to be actively involved in the management of the enterprise. Such involvement was costly, and it limited the potential for dividing risks and for diversification.

Because equity finance is costly, bundling all risks together to be born by the equity investor is inefficient. The bearing of external risks, precisely because they are not under the control of the enterprise itself, does not require active involvement in the management of the enterprise. Consequently, if external risks can be separated from internal risks, it should be possible to bear them at lower cost. This illustrates a more general principle: it should be possible to lower the cost of bearing risk by separating one risk from another and by placing each with the party that is able to bear it at lowest cost. Indeed, the history of the development of risk instruments is a tale of the progressive separation of risks, enabling each to be borne in the least expensive way.

THE SEA LOAN[3]

The earliest instrument that attempted to separate casualty risk from other business risks was the sea loan or *foenus nauticum*. This was a debt instrument used to finance maritime commerce that was repayable *only* upon the safe arrival of a ship or cargo: if the ship or cargo were lost, the loan was forgiven. In principle, the lender assumed only the casualty risk, with the borrower continuing to bear other risks. In practice, however, the separation was imperfect, because the other risks could cause the borrower to default.

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[2]See Kohn (1999)

[3]The following is based largely on Hoover (1926) , Trenerry (1926) , Usher (1943) , and de Roover (1945) .

The sea loan was in widespread use in Genoa in the twelfth century and a little later in other Italian maritime cities. However, its origin goes back to antiquity: the sea loan is mentioned in the Code of Hammurabi in 2250BC.

In the Middle Ages, sea loans made no explicit mention of interest: it was implicit, with the lender advancing a sum smaller than that stipulated for repayment. Rates to destinations near Genoa–in Sardinia, Corsica, Southern France, and Italy–ranged from 10% to 20%, while rates to distant destinations in the Levant could be as high as 50%. In one recorded example, agents of Venetian firms in the Levant wishing to purchase spices and dyes in anticipation of the arrival of the galleys, took sea loans payable by their principals in Venice at rates of 2% to 4% per month.[4]

Merchants in Genoa and elsewhere commonly used the sea loan to finance the purchase of goods they were taking or sending overseas. For short voyages, the loan was payable on the return of the ship. For long voyages it was more usually payable at the destination, in the money current there (a *cambium nauticum*); the agent of the lender could then make a new loan or remit the funds home by bill of exchange. Sea loans were generally payable several days after arrival to allow time for the sale of goods. Initially, contracts were commonly secured by real estate or by sureties provided by third parties. Later, when most borrowers were established merchants, it became common to secure a loan with the goods in question. In Genoa and in other maritime cities, the sea loan became a popular investment with all kinds of small investors.

There were a number of interesting variations on the basic sea loan. In the 'bottomry loan', shipowners borrowed to outfit a ship and advance wages to the crew; the loan was commonly secured with shares in the ship.[5] In the *pignus* loan, the *lender* was a merchant traveling overseas and the borrower a shore-bound merchant. The borrower pledged goods with the lender as security for the loan and the lender carried the goods overseas, with the loan repayable on safe arrival. It was understood by the parties, however, that the loan would not be repaid, and consequently that the lender would sell the pledged goods. He would then remit the excess of the proceeds over the amount of the loan back to the borrower; or, in the event of a deficit, the borrower would make up the difference on the

[4]Ashtor (1983) Despite these rates the trade was highly profitable. The markup on spices in Venice over Alexandria was about 50%. Customs, freight, etc., accounted for 15-25%. Interest at 4% for three months accounted for another 12%. This still left a profit of from 13-23%.

lender's return. This rather complicated arrangement placed the business risk with the shore-bound borrower and the casualty risk with the traveling lender (it also gave the latter an incentive to take good care of the goods). The *pignus* loan enabled the traveling merchant to trade a larger volume of goods without bearing all the business risk: presumably an agency commission was built into the pricing. In a variation of the *pignus* loan known as an 'insurance loan', the lender was a shipowner-carrier and the borrower was a merchant sending goods with him, unaccompanied, to an overseas agent. The loan was typically for only 25% to 30% of the value of the goods, and was payable on their safe arrival, rather than on the safe arrival of the ship. The function of the loan, presumably, was to serve as a performance bond for the carrier.

The sea loan suffered a number of serious disadvantages as a means of bearing casualty risk. For the lender, the possibility of default exposed him to business risk as well as to casualty risk. If he was to be exposed to business risk, the *commenda* was preferable because it at least gave him a share of the upside as well the downside. For the borrower, the problem with the sea loan was that it linked casualty coverage with a relatively expensive source of finance. The developing market for bills of exchange was much larger, deeper, and more competitive than the market for sea loans and it offered much better rates. However, to tap that market, borrowers had to find some means of covering the casualty risk, otherwise "an unlucky borrower might find himself in dire straits with his bills reaching maturity and his goods at the bottom of the sea".[6] Marine insurance provided the means to cover the casualty risk, and as marine insurance became more readily available during the fourteenth century, the popularity of the sea loan declined. However, it never died out entirely: bottomry loans were still common in the Netherlands and in England in the seventeenth and eighteenth centuries.[7]

The decline of the sea loan may have been hastened by Pope Gregory IX's condemnation of it, in 1236, as usurious.[8] Until then, the sea loan had been regarded as free of the taint of usury because of the risk of loss. Indeed, many ordinary loans had been disguised as sea loans for that very reason, with payment made contingent on the

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[5]Strictly, a bottomry loan is a loan taken by a shipmaster in a foreign port to finance repair of his ship, with the loan payable by the owners only if the ship returns safely. However, the term is used more broadly for any conditional loan taken by a shipowner or master. (de Roover (1945) fn. 7)

[6]de Roover (1945)

[7]See Barbour (1950) on the their use by the Dutch West India Company and Westerfield (1915) on their use by the English East India Company (in the form of 'bottomry bonds').

safe arrival of some unrelated vessel, or of one of several vessels to minimize the risk. The main immediate effect of the papal decretal was to promote the *cambium nauticum* at the expense of the ordinary sea loan: usury was not an issue for the *cambium nauticum* because of the permutation of currencies.[9] However, this instrument was unsuitable for small investors, because it required the lender to have an agent overseas. Although the issue of usury may have contributed to the decline of the sea loan, the main reason for its decline is more likely to have been the increasing availability of alternative financial instruments that the parties found preferable–the *commenda* and marine insurance.

MARINE INSURANCE[10]

For merchants engaged in maritime commerce to be able to switch from the *cambium nauticum* to the flourishing market for bills of exchange, they had to be able to shift the casualty risk that otherwise would have remained with them. It seems plausible that it was the merchant bankers who came up with the solution–marine insurance–since they were the ones who made the market for bills of exchange and they were presumably keen to obtain the additional business. The idea of making contracts contingent on casualty risk was well established. Both in sea loans and in contracts of *commenda* it was common to include a clause that specifically allocated the casualty risk, placing responsibility for safe delivery (*sauf en terre*) or expressly disclaiming responsibility in case of misadventure (*en aventure de mer et des gens*).[11] The terms of a contract depended on which party bore the risk, implicitly defining an insurance premium. It was a relatively simple step to write a separate contract for the casualty risk and to charge an explicit premium for bearing it.[12] The earliest surviving explicit insurance contract was written in Palermo in 1350.[13] In it, the insurer received a premium of 54 florins in exchange for a promise to pay 300 florins on definite news of loss of the cargo (or *pro rata* for partial loss). Since Palermo was in financial terms a relative backwater, it is likely that insurance had already existed for some time in more important centers such as Genoa and Venice, possibly as early as 1300.

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[8]de Roover (1969)

[9]The sea trade between Genoa and Sluys (the port of Bruges) after 1298 was largely financed with the *cambium nauticum.*

[10]The following is largely based on Trenerry (1926) and de Roover (1945).

[11]Under the typical *commenda* contract, if the goods were lost but the *tractator* survived, he owed the *stans* nothing. (de Roover (1945))

[12]Mitchell (1904)

The separation of casualty risk from credit risk allowed each to be borne at least cost. The casualty risk was largely independent of the specific merchant purchasing the insurance. It depended mainly on the route chosen, on the time of year, and on the political situation. Since an underwriter had no need for specific information about the insured, this increased the pool of potential underwriters and made it easier to spread the risk. Of course, the more the casualty risk was spread, the lower was the cost of bearing it. The credit risk, on the other hand, was borne by the merchant bank that advanced funds against a bill of exchange–a specialist in assessing credit risk. The merchant bank could also provide funding at relatively low cost, being able to draw on a well-functioning international money market.[14] Since it was common for the merchant banker who provided the finance to also organize the insurance, it is not surprising that the Florentines, who dominated merchant banking at this time, also came to dominate marine insurance: by the end of the fourteenth century, they were insuring two thirds of Venetian maritime commerce.[15]

During the fifteenth century, marine insurance spread from Genoa and Florence to the Western Mediterranean, the Low Countries and England, and from Venice to the Adriatic and the Eastern Mediterranean. There is evidence from the fifteenth century that 'marine' insurance was also used for overland commerce. In the sixteenth century, Bilbao, Seville, and especially Burgos became important centers of marine insurance; in the Low Countries, Spanish insurers competed vigorously with the Italians.[16] Marine insurance was well developed at Antwerp, finding a natural place in its Bourse, notorious for speculation and risk-taking.[17] In Amsterdam, the market for marine insurance was well developed by the end of the sixteenth century–no doubt stimulated by increasing risks due to naval warfare and privateering.[18] While marine insurance was known in England

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[13]Hunt (1994) p99.

[14]The same principle of separating risks so that they can be borne at minimum cost underlies the modern development of the swap market. The swap enables a separation of the credit risk, to be borne by a bank, from the interest-rate risk, to be borne by investors in the bond market.

Munro (1991) argues that the widespread warfare and disruption of trade around 1300, which raised the level of casualty risk, may have also contributed to the emergence of marine insurance.

[15]By the middle of the fifteenth century, Venetian bankers had largely recaptured the market for marine insurance in Venice. (Laven (1966))

[16]Ball (1977) Ch. 6

[17]Van der Wee (1963) p 366

[18]Barbour (1950)

in the fifteenth and sixteenth centuries, it was of little significance there until late in the seventeenth century.[19]

Despite its geographic spread, insurance was most widely used by the Italians. Francesco Datini instructed his agents abroad that they must always insure shipments to him; the Medici, in their contract with the manager of their Bruges office, stipulated that he must insure all shipments. But insurance was far from universal even among the Italians: for example, because the galleys were relatively safe, they and their cargoes were usually not insured. In northwest Europe, reliance on insurance was much less common. Premiums were high and, as we shall see, insurance was itself not without risk. In most cases, merchants in the Netherlands preferred to control risk by relying on armed ships and convoys or to spread risk through share finance rather than insurance. Most merchants and ship-owners avoided insurance except when war made the seas unusually dangerous. Even as late as the early seventeenth century, no more than 1% of Dutch shipping and 10% of merchandise was insured.[20] The picture was not very different in Antwerp or London.[21]

The insurance business took place in the Piazza or Bourse, alongside other financial transactions. Like other financial markets, the market for insurance was coordinated by specialized brokers. The party seeking insurance, or a merchant banker acting on his behalf, would engage a broker, who made out the insurance contract and circulated it among potential underwriters until a sufficient number had signed. Since individual underwriters would commit only to relatively small amounts–usually no more than 200 florins–a dozen or more were often required, and finding them could take weeks. In underwriting itself there was no specialization: merchants, shipowners, merchant bankers, deposit bankers, and others all underwrote insurance as a sideline to their principal business. Often, the most active underwriters were those best able to assess, or even influence, the risks. For the overland trade, the great companies had the advantage of political connections and a network of inn-keeper agents.[22] In the maritime trade, the advantage lay with cities who had the power to control the threat of pirates: Venice was the center of insurance for the Adriatic, insuring even the ships of rival cities such as Ancona and Ragusa.[23]

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[19]John (1958)

[20]Barbour (1929)

[21]See Van Houtte (1977) on Antwerp and Price (1991) on London.

[22]Hunt (1994) p 68

The earliest insurance contracts in Genoa took the form of a contingent loan, perhaps because enforcement was easier. Its terms were the opposite of those of a sea loan: the insurer promised to pay a specified amount *unless* the ship or cargo arrived safely; the 'principal' of the loan was presumably the premium paid to the insurer.[24] Later, the preferred form of contract was a conditional sale–a sort of put option–in which the insurer agreed to purchase the ship or cargo from the insured if it failed to arrive.[25] By the end of the fourteenth century, the explicit insurance contract had emerged and was widely used.

In Genoa, early insurance contracts had to be made out by a notary, and, if there were several underwriters, there had to be a separate contract with each. In Pisa and Florence, however, the procedure was less formal: brokers could make out the contracts themselves and the same contract could be signed by multiple underwriters. By the mid-fifteenth century, the Genoese had adopted the Florentine practice. By then, too, the language of the contract had become standardized both with respect to the risks covered and with respect to the guarantees offered by the underwriter. Risks that were covered included not only *risicum maris* –storm or shipwreck–but also *risicum gentium* –seizure by pirates and privateers–generally the more important. Coverage included, too, unseaworthiness of the ship, if unknown to the insured, but not malfeasance by the ship's captain. Reinsurance was quite common by this time, and the negotiability of insurance contracts was increasingly accepted.[26] By the sixteenth century, printed forms were in widespread use, with the parties needing only to fill in the particular details of the transaction.

Contracts specified the premium explicitly. The premium was sensitive to distance, route, season, and type of ship, as well as to news about hostilities or piracy. There was, of course, no actuarial basis, and premiums were generally arrived at by haggling and guesswork. However, in the sixteenth century, both in Venice and in Antwerp, there were professionals who specialized in assessing risks.[27] As the market developed, premiums declined: for example, the premium to Alexandria fell from 15% in 1350 to 2.5% in 1400. The Datini archives quote the following rates for 1384: from Cadiz to Sluys (for

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[23]Laven (1966)

[24]In contrast, in the sea loan, it was the borrower/insured who promised to pay, unless the ship or cargo *failed to* arrive.

[25]This had the advantage that if the ship or cargo was eventually recovered, the insurer had clear title.

[26]See Trenerry (1926) on reinsurance and Ball (1977) Ch. 6 on negotiability.

Bruges) or Southampton, 8%; from Porto Pisano to Naples or Tunis 5%, or to Barcelona or Palermo, 4%.

Insurance was plagued by all sorts of problems. Moral hazard was one: insurance encouraged captains to take risks–for example, to take a more hazardous route or to break away from a convoy to get to market first. To contain moral hazard, insurance was generally obtainable for only a fraction of the value of insured goods. Outright fraud on the part of the insured was not uncommon either–for example, deliberate shipwreck, or taking out insurance after receiving secret news of loss, or insuring the same ship in multiple places with multiple groups of insurers.[28] Nor were insurers free of guilt. Underwriters frequently defaulted. A merchant in financial difficulties could raise large sums by accepting premiums on insurance contracts, which he would then be unable to honor. Brokers were known to sign as underwriters individuals whom they knew to be unable to pay or even to forge bogus names and keep the premiums themselves. Insurance often served as a form of gambling: it was common for parties with no specific interest in a particular ship to take out insurance on it as a sort of wager. This behavior harmed the reputation of the market, although it could be argued that it performed an economically useful function by facilitating price discovery. Presumably such 'gambling' would have been unprofitable unless the premiums quoted were too low.

The problems of the market inevitably attracted the attention of the authorities, with the result that insurance became one of the more heavily regulated parts of the financial system.[29] Many cases found their way to the courts, especially when substantial sums were involved, and, over time, the accumulation of decisions created a body of insurance law. This tended to be fairly uniform from place to place–a part of the international Law Merchant. The customary laws were codified in Barcelona in 1484, in Florence in 1525, in Burgos in 1536, and later in Antwerp, Amsterdam, and London. This legislation regularized procedure and established standard terms for, for example, the percentage of value to be insured, the time after which a ship could be declared lost, and the time allowed in making a claim or paying a premium. The authorities also appointed officials or specialized courts to resolve disputes and sometimes to set rates. In some places, they required registration of insurance contracts, either with a notary or with a specially appointed inspector of insurance. Although only registered contracts had recourse to the special insurance courts in case of dispute, many merchants preferred to avoided

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[27]For Venice, Ball (1977) Ch. 6; for Antwerp, Van der Wee (1977) .

[28]Hunt (1994) p 99; Barbour (1929)

[29]Barbour (1929) , Ball (1977) CH. 6

registration, fearing disclosure of information potentially valuable to competitors–for example, cargo, destination, and premium. In England, unregistered or 'private' insurance remained far more common than registered or 'public' insurance.[30] In general, while the laws helped to prevent frauds, they sometimes stifled innovation, and tended to fossilize existing forms and procedures.

MARKET RISK

In addition to the casualty risk that could be addressed through insurance, merchants faced market risk. Of course, information was essential, and merchants devoted a great deal of effort to gathering and communicating information: the reading and writing of commercial correspondence took up much of a merchant's time. Merchants also protected themselves by diversifying–across the goods they traded, across markets, and across activities (adding production and finance to commerce). There were also two potential ways a merchant could hedge the risk of adverse prices–forward transactions and 'derivative' contracts. In a forward transaction, the parties agree on the terms of a trade to be consummated in the future, so that the trade will take place at the predetermined price however the conditions of the market turn out. In a derivative contract the payments the parties make one another at a future time are conditional on–or 'derive' from–the market price then obtaining.

One form of transaction that was particularly common–the advance purchase–combined a forward transaction with the extension of credit. In an advance purchase merchants paid producers *in advance* for future delivery. For example, in the thirteenth and fourteenth centuries, the great Italian trading companies in England normally paid for their purchases of wool one year ahead and sometimes as much as four, six or even twelve years ahead. The Cistercian monasteries from whom they bought sometimes sold forward quantities considerably in excess of their own output, expecting to purchase wool in local markets to make delivery. While these transactions may have shifted the risk of price movements–protecting purchasers against a rise and sellers against a fall–this was certainly not their main motivation: the monasteries were in chronic financial distress and desperately needed the funds. The ability of the Italians to pay in advance enabled them to capture the wool market from their English and Flemish competitors.[31] Indeed, it was probably true of most cases of advance purchase that they

[30]Sutherland (1933) The Amsterdam chamber of assurances was more successful because it respected the confidentiality of policies.

[31]Postan (1973) , Prestwich (1979) . Th advance purchase of wool in England, however, pre-dated the Italians: it had been customary among Artesian merchants in the twelfth century (Pirenne (1937) p 122).

had more to do with the extension of credit than with the shifting of market risk. However, in some cases, such transactions do seem to have been motivated primarily by considerations of risk. One recorded example involves forward transactions in foreign exchange by the same Italian trading companies. In 1317, the London branches of the Bardi and Peruzzi contracted with the Papal Nuncio in England to remit to Avignon papal taxes gathered in England: in these contracts the exchange rate was set for a whole year in advance, while the precise amounts and dates of transfer remained to be determined.[32] There were also some early examples of derivative contracts: in the fifteenth century, the Cerchi bank of Florence, a market-maker in government securities, bought and sold call options on *Monte* shares (options to purchase) with maturities as long as eight months.[33]

Despite these early examples, trading in market risk did not attain any significance until the sixteenth century. In 1501, the King of Portugal chose Antwerp as the market for the spices his ships were beginning to bring from the Indies. In Antwerp, syndicates of merchant bankers competed for spice contracts, paying in advance for spices to be delivered when the fleet arrived. The long delay between the setting of the purchase price and delivery, together with the volatility of prices, made these contracts highly speculative.[34] A vigorous commodity market grew up, trading not only in these contracts but also in other commodities with volatile prices, such as grain, salt, and herring. Transactions in these commodities were genuine forward transactions rather than advance purchases, with payment and delivery both taking place at a future date of settlement. Initially, it was possible to take a position in a commodity only through "the trouble and expense of actual trade".[35] However, as the market developed, there emerged various types of derivative contract. One was known as a 'premium transaction': this was a conditional forward transaction that gave either the buyer (a call option) or the seller (a put option) the right to cancel the contract at the time of settlement on payment of a premium (*stellegelt*) to the other party.[36] Premium transactions also took place in the exchange market. A second type of derivative was a variety of futures contract. Exchange dealers entered into wagers on exchange rates, betting on "percentage movements up and down, and settled their debts by transferring the margin between the loser's speculation

[32]Einzig (1962)

[33]Goldthwaite (1985)

[34]Strieder (1931)

[35]Ehrenberg (1928) p 241

and the actual course of the exchanges."[37] Later, this practice spread to the commodities market.

Trading in derivatives took place in the context of widespread gambling of all sorts. Wagers of all kinds were common on the Bourse. A popular wager was on the sex of an unborn child, from which came the general term for a wager–a *partura*. There were also wagers on political events–for example, on whether or not Philip II would visit Antwerp. Lotteries, too, were extremely popular. The authorities viewed all this activity with suspicion and disapproval: lotteries were regulated in 1524 and exchange-rate *parturas* were banned in 1541.

Historians, perhaps unduly influenced by the official view, have tended to see the trading in derivatives as no more than a form of gambling. However, it is plausible that it did perform an important economic function. Exchange bankers and commodity dealers could take positions in derivatives to hedge their positions in the underlying markets.[38] For example, a dealer purchasing grain for forward delivery could hedge the price risk by wagering that the price would fall by the time of delivery: if the price did indeed fall, his profit on the wager would offset his loss on the grain itself. Furthermore, speculators, through premium transactions and wagers, would have improved price discovery in the underlying markets. For example, suppose a large amount of buying by dealers had driven the price of grain 'too high' (given market expectations of the abundance of grain at the time of delivery). Speculators would have been able to profit by entering into the appropriate premium transactions (selling call options), expecting to pocket the premium without making delivery. This would have had the effect of driving the price down. Of course, even today the economic benefits of derivatives are not widely appreciated, so it is hardly surprising that they were viewed with hostility in the sixteenth century.

HOUSEHOLD RISKS

Households faced the same broad categories of risk as do households today. The death or disability of a breadwinner could leave his dependents without support. Fire or natural disaster could leave a family shelterless. Moreover, most production took place in

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[36]Van der Wee (1977) p 332

[37]Ehrenberg (1928) p 244. This seems much like a modern futures contract with cash settlement. The parties agree on a 'futures price'. If the actual price at the time of settlement is above the agreed futures price, the seller pays the buyer the difference times the notional principal (the size of the bet); if the actual price is below the futures price, the buyer pays the seller.

[38]"A bare wager on the price current at a future date afforded opportunities for a kind of hedge." (Usher (1943) p 133).

the household–most workers being ‘self-employed’ rather than employees. So households, as producers, faced many of the same risks as businesses. The principal means of protection against risk for households was mutual aid: families, gilds, and communes, by taking care of their own, provided a way to pool and to spread risk. Financial instruments of risk sharing played a very minor role.

In the social organization of the Germanic tribes, which was the basis for feudal society, the fundamental economic and social unit was the extended family rather than the nuclear family or individual. Property belonged to the family, and members of the family had a mutual obligation to help one another. Urbanization weakened the ties of family, and other social structures came to take on many of its functions.[39] In the towns, the early social gilds or fraternities were seen as a sort of extended family, with members described as ‘bretheren and sisteren’, and the same idea carried over to later merchant and craft gilds and to communes and boroughs.[40] Gilds established funds, maintained by periodic subscription, to support the widows and orphans of members and to extend loans to brethren in need. Gilds and communes also provided insurance against fire, shipwreck, ransom, and other misfortunes: in the event of a loss on the part of one member, the others were assessed a contribution proportional to the value of their property. Villages sometimes joined together in regional groups to provide similar protection against fire and loss of livestock.[41] Of course, charity was a greatly valued virtue. The Church played an important role in protecting the poor, and the wealthy endowed charitable institutions-‘hospitals’–to care for orphans, foundlings, or the sick.

The only financial risk instruments available to households were various life-contingent contracts.[42] A wealthy merchant might purchase life annuities to provide for his dependents in the event of his death or to provide for his own retirement from active commerce. He might similarly purchase from the state a life office or a pension for much the same reason. For fathers of daughters, an important responsibility was to provide them with dowries: the only respectable situation for a woman was marriage or a convent, and both required a dowry. In 1425, Florence set up a financial institution, the

[39]The following relies on Trenerry (1926) , Scott (1912) , and Epstein (1991) .

[40]All of these associations had an important religious dimension, and, in addition to helping their own members, engaged in collective works of charity to aid the urban poor.

[41]Municipal fire insurance survived into the nineteenth century in Germany and was so satisfactory that the Sun Fire Office found it difficult to sell its commercial policies there (Dickson (1960)) .

Monte delle Doti, to provide its citizens with a way to meet this obligation.[43] A father could make a deposit for a fixed term–either seven and a half or fifteen years. At maturity, if the nominated daughter survived and married, and the marriage was consummated, a specified amount would be paid to the girl's husband; otherwise, the deposit reverted to the commune. The initial terms were insufficiently attractive, perhaps because the prevalence of the plague lowered the odds of collecting, and there were very few takers. However, when, the terms were improved in 1433 and payment was promised to the father in case the daughter did not survive, investors responded with enthusiasm. Indeed, benefits from the *Monte delle Doti* came to make up the bulk of most Florentine dowries, and the existence of the fund seems to have encouraged earlier marriage and raised the birth rate. The *Monte delle Doti* was in several ways a precursor of modern social insurance. It was essentially a pay-as-you-go program: deposits were used initially to redeem government debt (the *Monte Commune*), and no specific funding was allocated to meet future obligations. As the program matured, it proved unsustainable, and, in 1478, had to be reformed. The *Monte delle Doti* also changed perceptions of the proper role of the state: "The republic was now responsible not only for the defence of the Florentines, but even for the proper marriage of their children… [T]his… induced the citizenry to look towards the state for its well-being"[44]

Insurance of lives did exist, but it was very different from modern life insurance. In Genoa and Barcelona in the fifteenth century, it was possible to insure the life of a pregnant wife or a pregnant slave.[45] Traveling merchants were able to take out insurance that would cover the ransom if they were captured by pirates.[46] Borrowers would sometimes insure their lives as security for a loan. However, these contracts were all short-term–a year or less–and they were no more than a minor adjunct to the market for marine insurance. It was also possible to purchase 'insurance' on the life of a public figure (a pope, a doge, or a king), but this was really no more than a wager. The practice was banned in Antwerp in 1571.

As is true today, instruments for mitigating risk coexisted with instruments of risk-taking: gambling in all its shapes and forms was extremely popular.[47] In the fifteenth

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[42]Alter and Riley (1986)

[43]Kirshner and Molho (1978)

[44]Becker (1968)

[45]Laven (1966)

[46]Smith (1941)

century, towns in the Low Countries pioneered the use of lotteries for the financing of public works. In addition to the simple ticket lottery, they developed the multi-stage or 'Dutch' lottery, in which winners in each stage participated in subsequent stages with ever greater prizes. The provincial government, presumably under Hapsburg pressure, prohibited all lotteries in 1526. Public lotteries spread to Florence and to England in the sixteenth century. The Elizabethan Great Royal Lottery of 1568 was expected to net some £100,000 to fund harbor improvements and other works. Some 400,000 tickets were offered at 10s. each, with every ticket a winner: prizes began at 2s. 6d and rose to a maximum of £3,500. However, the public found the odds unattractive and bought only 35,000 tickets; the expenses ate up the profits. Nonetheless, the idea of public lotteries survived and lotteries and lottery bonds were to become an important element of public finance in the seventeenth and eighteenth centuries.

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[47]Ewen (1972 [1932])

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