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**EVADING THE 'TAINT OF USURY' COMPLEX
CONTRACTS AND SEGMENTED CAPITAL MARKETS**

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Evading the 'Taint of Usury' Complex Contracts and Segmented Capital Markets*

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'Where law or conscientious scruples prevent lending at interest, the capital which belongs to persons not in business is lost to productive purposes, or can be applied to them only in peculiar circumstances of personal connexion, or by a subterfuge.

Principles of Political Economy
JOHN STUART MILL (1848, 288)

'the ecclesiastical persecution of usurious lending arose and became ever more intense virtually as a concomitant of the incipient development of actual capitalist instruments and particularly of acquisitive capital in overseas trade.'

Economy and Society
MAX WEBER (1968, 584)

ABSTRACT

What were the economic consequences of the usury doctrine in the Middle Ages? We examine how merchants attempted to evade the prohibition on interest and the attempts of the Church to clamp down on evasion. Contrary to the views of many economists and historians, the usury prohibition imposed *differential transaction costs* on medieval merchants: increasing the cost of using capital markets for some merchants more than for others. Since only a subsection of the merchant population were able to write licit contracts, the prohibition had the effect of segmenting markets in which formal credit was important.

Key words: usury, transaction costs, contracts

JEL classification: N23, G21

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I INTRODUCTION

Recent work in economics and economic history emphasizes the importance of institutions in explaining economic growth over the long-run.¹ This paper examines a particularly long-lasting and persistent European institution: the Catholic Church's prohibition of lending money at interest.

A number of economic historians date the beginning of the economic rise of Western Europe to the period between 1100 and 1300.² This was a period during which population growth and internal colonization was accompanied by accelerated urbanization, improved trade and transport links, and an sustained expansion of the market.³ Furthermore, as Harold Berman (1983) observed, this was a time of remarkable financial innovation, exemplified by

‘the invention of the negotiability of bills of exchange and promissory notes; the invention of the mortgages of movables (chattel mortgages); the development of a bankruptcy law which took into account the existence of a sophisticated system of commercial credit; the development of the bill of lading and other transportation documents; . . . the invention of trademarks and patents; the floating of public loans secured by bonds and other securities; the development of deposit banking’ (Berman, 1983, 349–350).⁴

Financial innovation took place despite the fact that Church strengthened the prohibition on usury several times over the course of the twelfth and thirteenth centuries.

This paper addresses this apparent paradox by asking the following questions: What was the impact of this prohibition? How did it effect economic development in medieval Europe? What were its long run implications?⁵ Why was the usury prohibition comparatively lax during the early Middle Ages and why did it subsequently tighten during the Commercial Revolution?

To answer these questions we build on an argument first made by Raymond de Roover. For de Roover, the canonical prohibition on usury shaped business methods, organisation and attitudes throughout the medieval period for at least three reasons (de Roover, 1974, 185).⁶ Firstly, though the prohibition on usury could be evaded, evasion was costly. Secondly, the cost of the evasion fell unevenly on different types of commerce and on different kinds of merchants. And thirdly, the usury prohibition, and the authority of the Church carried significant moral weight: ‘[c]ontrary to what many believe, bankers did not simply disregard the usury doctrine, but they made an effort to comply’ (de Roover, 1967, 265).

In this paper, a formal model is developed to investigate these claims and to derive hypotheses that are historically falsifiable. We can account for many features of the medieval usury prohibition. In particular it can explain why the laws delineating legitimate from illegitimate contracts became more sophisticated and more severe as capital markets developed and interest rates fell over the course of the Commercial Revolution. We find evidence supporting the view that the usury prohibition acted as a barrier to entry, reducing competition, and encouraging collusion between merchants. The Church had an incentive to exploit its moral authority in order to claw back a

proportion of these monopoly rents in the form of restitution and donations. The usury prohibition increased transaction costs, and diverted capital from sectors where it was difficult to covertly borrow at interest like domestic industry, towards areas like international trade where evasion was much cheaper.

We suggest that the prohibition on usury was felt most strongly in the Italian city states. In the late Middle Ages, the Italian cities states were the most commercialised and urbanized economies in Europe (Bernard, 1972, 291). The European economy was highly integrated and dependent on trade and Italian bankers were active across Europe (Hunt and Murray, 1999, 92–96). Trade within these cities was increasingly based upon impersonal rather than personal exchange.

Credit was an indispensable part of this trade. The historian Richard Marshall, describing fourteenth century Prato, observes that credit ‘was a way of life’ (Marshall, 1999, 72). What was true of Prato was true across the commercial centres of North Italian and along the major trading routes of Western Europe. Credit played a crucial role in what Peter Spufford has termed the ‘transformation of commerce’.⁷ However, despite the importance and the ubiquity of credit in the medieval economy, formal capital markets were circumscribed. Any return on a loan (*mutuum*) beyond the principle was forbidden (de Roover, 1967, 258).

We ask the following counter-factual question: how different would the development of European capital markets have been in the absence of the prohibition against usury? Usury laws of the kind that characterised medieval Europe and Islam were not universal. Restrictions on the amount of interest a lender could charge are common across societies but religious prohibitions on interest *per se* were unknown in classical antiquity and in East Asia.⁸

THE ‘TAINT OF USURY’

Henri Pirenne observed that ‘the censure of the Church was always hanging like a permanent menace over all who concerned themselves with credit’ (Pirenne, 1936, 140). All lending at interest was condemned as usury. The canonists did not distinguish licit from illicit practices according to the purpose of the loan or the rate of interest. Usury was exclusively associated with *mutuum* contracts because these were loans of fungible goods where it was possible for the borrower to return the principal to the lender in full. Any interest-bearing loan was usurious.⁹

Why was usury condemned? Usury was a sin against justice, separate from and worse than, the sin of avarice or an absence of charity. In part, this was because it directly violated Luke’s injunction to lend freely hoping for nothing in return.¹⁰ In part, it was because one gained something for nothing; moreover it could be clearly distinguished from profit because it entailed no risk. For the twelfth century theologian Peter the Chanter, the usurer effectively stole from, and exploited, the labourer because ‘he profited without labor, making a livelihood even while sleeping’ (Baldwin, 1970, 271). Furthermore, in an argument made famous by Thomas Aquinas, since it involved the theft of time, which belongs only to God, ‘[c]harging for the loan of money is unjust as such, for you are selling something that doesn’t exist’ (Aquinas, 1989, 396).¹¹

Usury was not condemned on instrument or pragmatic grounds but because it was viewed as intrinsically sinful. In first half of the thirteenth century, William of Auxerre (d. 1231) condemned usury as theft whilst recognising that it was socially useful: that 'a certain worldly good to the community may arise from this kind of theft'.¹² The usury doctrine promoted 'usury as a sin independent of the borrower's circumstances and his allocation of credit' (Melitz, 1971, 476).¹³

Usury was a sin of intent; a sin of the mind, dependent upon the attitude of the lender. According to Robert of Courson (c. 1160–1219) usury was the sin of either receiving anything above the principal or lending in *hope* of receiving any such addition (Langholm, 1992, 46). Attempts to use legitimate contractual forms for usurious purposes still constituted usury.¹⁴

THE LEGAL PROHIBITION

This paper focuses on the ecclesiastical prohibition on usury. Usury was vigorously prosecuted cross Europe.¹⁵ Canon law forbade all interest on loans. Secular authorities also prosecuted usury cases although they varied in their attitude to usury.¹⁶ Canon law was unique, because its jurisdiction extended across Latin Christendom and because it was universal in application (Brundage, 1995, 3) In addition to governing the behaviour of the clergy, it served to regulate social and commercial mores and norms. Church courts operated in addition to, and independently from, local and national courts. Merchants, traders, moneylenders, and shopkeepers alike all had to consider carefully the attitude of the Church. It regulated all aspects of social life including the rights of wrongs of commercial transactions (Wood, 2002, 2). In this sense canon law regulated and upheld certain social, sexual, and commercial norms, in conjunction with the provision of 'such goods as assurances of eternal salvation, political support from the papacy and clergy, and social services' (Ekelund et al., 2006, 93).

This paper seeks to explain why the Commercial Revolution of the twelfth and thirteenth century was accompanied by a sustained 'campaign against usury' waged by the Church.¹⁷ Strikingly, the intensification of this campaign coincided with a period of falling, not rising interest rates. This appears paradoxical unless it is understood that the campaign was a response to the mere existence of interest-bearing loans, and not to the level of interest charged. Homer and Sylla (2005) record a fall in reported interest rates on commercial loans from the Italian city states from 20–25 percent in the twelfth and early thirteenth century to between 7–15 percent in the period 1250–1350.¹⁸

As the restrictions on lending became greater during the thirteenth century, merchants invested resources in evasion. The prohibition thus prompted contractual innovation. This 'red queen' dynamic why both both the prohibition itself and the contracts employed by merchants became ever more sophisticated over time.¹⁹ Merchants responded to the law by devising ways of evading the law, and the Church responded by making the law more sophisticated. 'It was the peculiar fate of the usury prohibition in the Middle Ages that every time it seemed to be weakening in the face of reality, theorists would strengthen the ban' (Rothbard, 1995, 54).

DIFFERENTIAL TRANSACTION COSTS

The claim of this paper is that the usury prohibition shaped the development of markets in Europe because it imposed *differential* transaction costs on different exchange parties. Transaction costs are the costs of writing, and enforcing contracts (North, 1984, 7). Transaction costs differ from other economically-relevant costs because when transaction costs are high, economic agents will expend resources in the attempt to moderate or evade these costs.

The prohibition increased transaction costs in credit markets; one way to reduce those costs was to write a contract that disguised the interest payment but this act of evasion was itself costly. Economic historians have long known that it was possible to evade the usury prohibition. But in general they have drawn the wrong conclusion from this, arguing that the prohibition cannot have imposed substantial costs of the medieval economy if it was possible to evade it.²⁰ However evidence that the prohibition was evaded does not constitute evidence that its evasion was costless.²¹

Similarly many medieval historians view the medieval Church as increasingly favourable to commerce in the twelfth and thirteenth centuries.²² This is misleading.²³ Analysing the Church's attitude requires looking at the set of contracts that were enforceable under canon law. Many intertemporal contracts in particular, could not be enforced by courts, because they were deemed usurious. The result of this was that—regardless of what the canonists said concerning property rights—property rights in capital markets were, in fact, very poorly specified, and specifying them in such a way that they would be enforceable in court was a costly procedure.

The opportunity costs of the usury prohibition constituted, not only all of the transactions that would otherwise have taken place had it not existed, but also the resources invested in evading it. When interest-bearing contracts are not enforceable in court, a borrower has an incentive to renege on any agreement made with the lender. A lender found guilty of usury had to make restitution, his name was tarnished and he could be fined or subjected to additional punishments depending on the circumstances of the case.

Nor did the usury doctrine distinguish between consumption and investment loans. There was no difference between borrowing in order to meet an immediate need and borrowing in order to invest. A merchant might be both a lender and a borrower. Marshall notes when 'tradesmen of Prato had a large proportion of their own assets tied up in customer debt balances, they also sought and received credit from their suppliers (Marshall, 1999, 81).

The usury prohibition was a restriction on the form that credit contracts could take. Had it been enforced perfectly, a vast of number of transactions involving credit would simply not have taken place; formal credit markets would not have existed. Merchants would have been dependent on personal loans. Conversely, the fact that it did not bind completely in no way implies that the the same number of credit transaction occurred as would have occurred under a hypothetical *laissez faire* scenario.

This highlights an important implication of our argument: the usury prohibition re-

tarded or distorted the transition from informal credit arrangements to a system of formal or impersonal credit. In small-scale or close-knit societies such bilateral credit agreements and loans can exist *informally* and to the extent that credit relations are reciprocal, there may be sufficient incentives for individuals to lend without charging interest.²⁴ But in larger-scale or more fluid societies, contracts are necessary since creditor-debtor relations require third-party enforcement; furthermore, since in such societies, credit relations are unlikely to be reciprocal or repeated over time, such contracts will invariably be interest bearing. The implication of this is since that the prohibition on interest was likely to impose the highest costs in the most commercially developed parts of Europe—the Italian city states—it is there that we can expect the most resources to be devoted to evading the prohibition.

COMPLEX CONTRACTS

The usury prohibition led to a requirement for more complex contract in all trades involving intertemporal exchange. Over time, merchants and traders devised a number of different ways in which the prohibition could be evaded. A principle clerical objection to interest was the notion that it was “certain” and without risk.²⁵ It was permissible to gain from intertemporal trade only in so far as such gains were considered risky and it was possible to share the burden of risk between borrower and lender. A number of important financial instruments were developed during the medieval period precisely for this purpose.

Formal contracts specify contingent obligations. They will thus be of the form: “*A* will pay *B* a sum equal to *y* so long as good *x* is delivered by date *z*”. It may be possible to specify the condition of good *x* or the method of delivery or form in which payment occurs but each additional contingency requires writing a longer, more complicated contract. More sophisticated contractual forms can enable trading partners to overcome a number of difficulties: as Oliver Williamson writes, ‘complex contracts can often be devised that are responsive to the needs of the parties’ (Williamson, 1985, 327).

Contractual complexity, though a testament to the sophistication and acumen of medieval merchants, did not come without costs. Exchanging rights over goods is costly as Barzel (1997, 1989) emphasized. How is quality to be measured? Who supervises the method of delivery? Contracts are necessarily incomplete; it is impossible to account for every possible contingency (Hart, 1995). Increased complexity makes it more costly to delineate the relevant variables specified in a given contract, and thus exacerbates the costs imposed by contractual incompleteness. The implication is that contractual complexity is a margin along which rational agents adjust according to circumstances. The extent or character of the contractual incompleteness determines the *ex post* bargaining power of either party. Such contracts are more costly to write, agree to, monitor and enforce. Complexity increases the cost of transacting. It creates problems of haggling and hold-up.

A loan contract can exhibit varying levels of complexity. In the simplest form, a loan contract specifies a principal and a rate of interest. But such contracts became unenforceable because of the odium associated with usury. The predominant response was to write more specific and detailed exchange contracts that contrived at disguising

the payment of interest contracts. To do this medieval merchants devised or utilised a range of different financial instruments: mortgages, sea loans, and bills of exchange in order to effectively lend at interest without incurring the opprobrium of being convicted by the Church courts as usurers.

II THE MODEL

OVERVIEW: NO PROHIBITION BENCHMARK

Merchants in the Middle Ages depended on credit in order to trade. This credit could be formal or it could be informal. Merchants could use the credit market where written contracts were employed and interest charged or they could depend on informal credit networks.²⁶

This section presents a reduced form model of a formal credit market in which there is no clerical prohibition on interest. Lenders and borrowers are symmetric; trade is bilateral, and by definition, mutually beneficial: individuals only participate if they have something to gain. Complex contracts are not required to enter the credit market. For simplicity we assume that the formal credit market is always superior to informal credit and that without the prohibition, all merchants use the formal credit market. In what follows, questions concerning the credibility of the borrower, the rate of interest, and quality of information are suppressed so as to focus on the question of contractual complexity.²⁷

There is (i) a continuum of merchants indexed by $i \in N$ where $|N| = n$; (ii) a monopoly provider of law L called the church; (iii) a non-strategic player representing the courts. Each merchant i is assigned an ability π . There are three different ability levels corresponding to different merchant types: low ability types π_L , medium ability types π_M high ability types π_H . The total populations of merchants is normalized such that $n = 1 + \alpha$ where there are α low types, β medium types and $1 - \beta$ high types.

Each merchant i takes two actions: (1) chooses a level of human capital h_i ; (2) decides to participate in the market credit: $c_i = 1$ or $c_i = 0$ is an indicator function capturing this dichotomous decision.

The benefit each merchant i receives from participating in the market is given by $(\Psi\pi_i)/\phi$ where Ψ is an index measuring how commercialised the economy is and $1/\phi$ measures how competitive the formal sector is. Competitiveness is measured by the number of merchants participating in the formal credit sector.

$$\phi = \frac{1}{C}, \quad \text{where } C = \sum_{i=0}^{i=n} c_i$$

Therefore since there are three types of merchant: ϕ can take one of three values: (i.) $\phi = 1$ where $c_i = 1 \forall i$ such that $\pi_i = \pi_H$ and $c_j = 0 \forall j$ such $\pi_j \neq \pi_H$; (ii.) $\phi = 2$ where $c_i = 1 \forall i$ such that $\pi_i \in (\pi_H, \pi_M)$ and $c_j = 0 \forall j$ such $\pi_j = \pi_L$; (iii.) $\phi = 3$ where $c_i \forall i$.

π_i	=	Ability
γ	=	Total amount of usury
c_i	=	Credit market indicator function
Ψ	=	Index of commercialisation
ϕ	=	Level of competition

Table 1: Basic parameters of the model

This can be expressed more conveniently as:

$$\phi = \begin{cases} 1 & \text{if high types compete,} \\ 2 & \text{if medium and high types compete,} \\ 3 & \text{if everyone competes.} \end{cases}$$

Similarly the total amount of usury in society — defined as the number of merchants for whom $c_i = 1$: $\gamma = nC = n \sum_{i=1}^{i=n} c_i$ — will have four discontinuous values:

$$\gamma = \begin{cases} 0 & \text{no usury} \\ 1 - \beta & \text{only high types use credit,} \\ 1 & \text{high and medium types use credit,} \\ 1 + \alpha & \text{Everyone uses credit.} \end{cases}$$

This means that there are four possible equilibria. For the most part we restrict our attention to the two possible interior equilibria i.e. where the amount of usury in the economy takes on an intermediate value between $1 - \beta$ and 1. The two potential corner equilibria where either there is no usury law at all and everyone lends at interest, or the usury law is so severe as to eliminate lending altogether, are not historically relevant but they provide a useful benchmark for analysis.

Merchants are randomly matched in pairs. Trade takes place and payoffs are realized. The assumption of random matching ensures tractability. In actual fact merchant bankers lent to certain individuals more than others. Connections were forged through kinship networks, particularly marriage, and through political alliances. McLean and Padgett (2006) find that in Florence 63 percent of credit contracts recorded in the *catasto* of 1427 were relational. A more realistic setup would involve paired merchants participating in a potentially infinite number of repeated interactions where there was some exogenous probability of separation. The model presented here is a special case of this more general model when the probability of separation each period tends towards infinity. Including long-term relationships explicitly would only strengthen the findings of the model.

The results of the benchmark case are simple. By construction, all merchants participates in the formal credit market. All merchants commit usury. Competition drives down profits. No merchants need to invest in human capital. In the absence of a usury prohibition participation in the credit market will be broad-based. Credit instruments will no more complex than they need to be for the transaction at hand and contract complexity will be closely correlated with transaction costs.

I SETUP

The order of play. This is a game of complete information. The sequence of the game is depicted in figure 1. (i.) The Church determines the sophistication of the law L . (ii.) Each merchant i chooses to make one-off investment in human capital h_i at cost e_i . Each merchant i also decides whether to engage in the credit market ($C_i = 1$) or not ($C_i = 0$). (iii.) Merchants involved in the credit market are randomly matched with each other. The contract each pair of merchants is able to use $\theta_{i,j}$ is determined by h_i and h_j . (iv.) The courts form a probabilistic assessment whether a randomly selected merchant i can be prosecuted for usury on the basis of L and $\theta_{i,j}$. (v.) Trade takes place. Payoffs are realised. Merchants caught and found guilty of usury are punished.

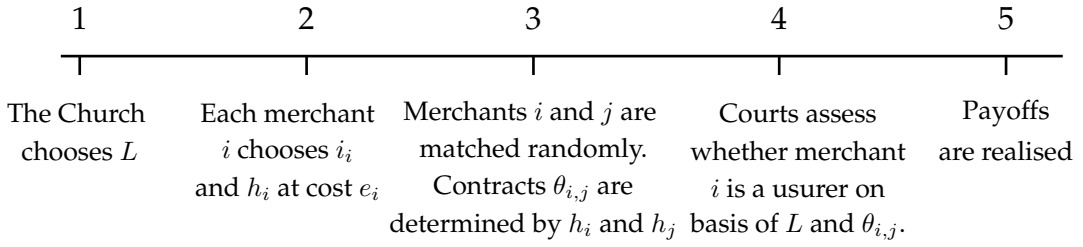


Figure 1: The order of play.

Human Capital. The skills required to write complex contracts are captured by $h \in (0, 1)$, a measure of the agent's level of human capital. At the beginning of the game each merchant makes a one-off investment in h . The cost of each merchant i investing in a level of human capital h_i is $e_i(h, \pi_i)$ where e — representing effort — is increasing in h and decreasing in π . Therefore we have $e(\pi_L, h) > e(\pi_M, h) > e(\pi_H, h)$. A higher level of h enables merchants to write more complicated contracts and hence evade the clerical prohibition on usury. We set $e(\pi_L, h) = \infty$. This is equivalent to assuming that low ability merchants never invest in human capital.

Contracting Technology. The complexity of a contract between merchants i and j is denoted by $\theta_{i,j}$ where $\theta_{i,j}$ is distributed continuously along $(0, 1)$. The cost of writing, understanding and complying with a more complex contract decreases with the amount of human capital a merchant has. The level of human capital a merchant has h_i and merchant j has determines the complexity of a contract that the two merchants use together.

$$\theta_{i,j} = \min(h_i, h_j).$$

In other words this technology is Leontief. Human capital enables a given merchant to write a more sophisticated contracts only in so far as his trading partner is also capable of using such a contract.

The Courts. The role of canon courts was to enforce the law of the Church L . The Church chooses a level of legal scope and sophistication L . In each period, the court selects one $i \in N$ with equal probability λ/n for each agent for investigation for usury, where λ is the number of merchants that can be called before the court at any one time. The more

L	=	Legal sophistication	η	=	Weight on usury
$\theta_{i,j}$	=	Contract complexity	e_i	=	Effort
h_i	=	Individual human capital	Γ	=	Punishment for usury
H	=	Total human capital	λ	=	N. investigated

Table 2: Additional parameters of the model

extensive the law (the higher is L), the greater the probability P_i that the court will find a merchant involved in providing credit guilty of usury.

P_i is the probability that merchant i can be proved guilty of usury in court. The more complex a contract i can write, the smaller the probability that he will be convicted. Similarly the more sophisticated the legal system is, the easier it is for the court to convict.

$$\frac{\partial P_i}{\partial \theta_{i,j}} < 0, \quad \frac{\partial P_i}{\partial L} > 0, \quad P \in (0, 1)$$

Matching. Merchants who have decided to enter the credit sector are randomly matched. The probability that a high type merchant i is matched with another high type merchant conditional on having entered the market himself is $(1 - \beta)/C$ where $C \in (1 - \beta, 1, 1 + \alpha)$. Therefore when only high type merchants are participating in the credit sector, merchant i will be matched with another high ability merchant with probability 1, when both high and medium types are using credit, this probability falls to $1 - \beta$ and when all merchants are participating in the market it falls to $(1 - \beta)/(1 + \alpha)$.

The Church. The Church has two competing objectives saving souls S and raising revenue R . Both R and S are functions of the total amount of usury in society: $U^C \{(1 - \eta)R, (\eta)S\}$, where η reflects the weight the Church places on the salvation of souls relative to the accumulation of wealth. For concreteness let R take the form $R = \beta\gamma$ where $\beta \geq 0$ is an index of commercialisation and let S depend solely on restricting usury. We will then work with the following following additively separable quasi-linear function:

$$U^C = (1 - \eta)\beta\gamma + \eta S(\gamma). \quad (1)$$

The function S is decreasing in usury γ at an increasing rate: $S'(\gamma) < 0$ and $S''(\gamma) < 0$ where $S(\gamma = 1) = 0$. In order to derive a closed-form solution we assume the following functional form for S :

$$S = -\gamma^2.$$

This ensures that the quasi-linear function U^C has a unique optimal L^* for all $\gamma \in [0, 1]$. As the amount of usury in society increases, the initial spiritual costs to the Church S are comparatively small (S is concave) while the material benefits are collaboratively large (R is linear). Therefore the Church has an incentive in permitting usury up to a certain level γ^* where $U'_\gamma = 0$. Beyond this point however, the spiritual costs of usury increase at a faster rate than do the material benefits and the Church has an incentive to reduce the total amount of usury in society.

Merchants. Merchant i 's revenue is given by his ability conditional on his participation in credit markets, his costs, by the effort expended in acquiring human capital, while the last part of the expression represent the probability of being successfully prosecuted where Γ is the punishment associated with conviction. The profits merchant i receive from participating in the formal credit sector are weighted by Ψ .

$$\max_{h_i, c_i} U^M = c_i[\phi\Psi\pi_i - \Gamma(\lambda/n)P_i(L|\theta_{i,j})] - e(h_i, \pi_i), \quad (2)$$

where $i, j \in (L, M, H)$. If a merchant decides to enter the credit market, his profits are increasing in his ability π , the level of overall market development Ψ , and falling in the level of competition $1/\phi$, the probability of being convicted as a usurer P_i , and the effort spent acquiring human capital e_i .

II EQUILIBRIUM

Since this is a game of complete information, the relevant solution concept is a subgame perfect Nash equilibrium. The Church can solve for the optimal value of L taking the equilibrium response of the merchants as given. First we consider the subgame at $t = 2$ which corresponds to merchant i 's choice of c_i h_i . Consider the first order conditions to equation 2. Since c_i is not continuous it is not possible to take first order conditions. The first order condition in h_i is equal to:

$$-\frac{\partial e(h_i, \pi_i)}{\partial h_i} - c_i \frac{\lambda\Gamma}{n} \frac{\partial P_i(L|\theta_{i,j})}{\partial h_i} = 0. \quad (3)$$

We have assumed that low ability types never find it worthwhile to invest in human capital. Similarly it is evident that no merchant who does not enter the credit market will ever find it worthwhile to acquire human capital since equation 3 evaluated at $c_i = 0$ is simply $-e'_{h_i}$. Since $-e'_{h_i} < 0$, the value of h that maximizes equation 2 when $c_i = 0$ is zero.

More significantly we can establish that merchants who do enter the credit sector will always invest in positive levels human capital for all value of $L > 0$. This can be established by setting $c_i = 1$, and rewriting 3 as:

$$-\frac{\partial e(h_i, \pi_i)}{\partial h_i} = \frac{\lambda\Gamma}{n} \frac{\partial P_i(L|\theta_{i,j})}{\partial \theta_{i,j}} \frac{\partial \theta_{i,j}}{\partial h_i}. \quad (4)$$

$P_i(L|\theta_{i,j})$ is falling in $\theta_{i,j}$ and $\theta_{i,j}$ is weakly increasing in h_i .²⁸ Thus the right-hand-side of equation 4 is negative by definition. Therefore at the optimum h_i must be positive. This means that both types of merchants *High* and *Medium* have to acquire human capital if they participate in the formal sector.

We are now in position to consider the two candidate equilibria. The first candidate equilibrium in which high and medium types can enter can called the *Simple* equilibrium. The second candidate equilibrium in which only high type merchants enter the market can be denoted the *Complex* equilibrium.

PROPOSITION 1: The interior candidate equilibria have the following characteristics:

Simple When the optimal amount of usury is $\gamma^*(L) = 1$, high and medium type merchants participate in the credit market. The average contract used is equal to $(1 - \beta)^3 \hat{h} + \beta^2 h^*$.

Complex When the optimal amount of usury is $\gamma^*(L) = 1 - \beta$, only high ability merchants participate in the credit market. All merchants invest in human capital and all credit contracts are complex: $\theta_{i,j} = \hat{\theta} = \hat{h}$ for all i and j such that $c_{i,j} = 1$.

Proof. The second part of this proposition can be established first. If in equilibrium $\gamma^*(L) = 1 - \beta$, then by definition only high ability merchants participate in the credit market. From equation 4 we know that all merchants in the credit market will acquire some positive level of human capital. In equilibrium all merchants i such that $\pi_i = \pi_H$ will invest in same amount of human capital $h_i = \hat{h}$. Using the fact $\partial \theta_{i,j} / \partial h_i = 1$ if $h_i = h_j$, equation 4 can be rewritten as:

$$\frac{n}{\Psi \Gamma \lambda} \frac{\partial e(\pi_H, \hat{h})}{\partial \hat{h}} = - \frac{\partial P(L|\theta_{i,j})}{\partial \theta_{i,j}}. \quad (5)$$

where $h_i = h_j = \hat{h}$ is the optimal level of human capital for merchants with high ability to acquire given that they know with probability 1 that we will be matched with another high ability merchant. This determines the level of contractual complexity $\theta_{ij} = \min(h_i, h_j) = \hat{h} = \hat{\theta}$ as stated. This is a stable equilibrium so long as the following incentive compatibility constraint is satisfied:

$$\pi_H \geq \frac{\Gamma \lambda}{n} P(L|\hat{h}) + \frac{e(\pi_H, \hat{h})}{\Psi}. \quad (6)$$

This guarantees that high ability merchants obtain weakly positive payoffs from entering the market.

To establish the first part of the proposition note that when $\gamma = 1$, the cutoff level of human capital h^* is given by the amount of human capital selected by agents with ability equal to π_M . This is the level of human capital at which a medium ability merchant is indifferent between acquiring human capital and entering the market and not entering the market. This is given by the incentive compatibility constraint for medium ability merchants:

$$- \frac{\Gamma \lambda}{2n \Psi} P(L|h^*) \leq \frac{e(\pi_M, h^*)}{2\Psi}, \quad (7)$$

which binds with equality in equilibrium. The type of contract a medium type merchant uses is determined solely by his own level of human capital h^* . Denote the contract used by all merchants i such that $i \in \beta$ by θ_M . We can then state that $\theta_M = h^*$ regardless of who is matched with whom.

In order to characterize the equilibrium we need to know the level of human capital choose by the high type merchants given the choice of h^* . A high type merchant will be matched with a medium type merchant with probability β and with another high type merchant with probability $1 - \beta$. If a high type merchant is matched with a medium

type merchant the most complex contract he can sign is equal to h^* . This means that an acquiring human capital $h_i > h^*$ is only worthwhile if two high types are matched together. Since $\partial\theta_{i,j}/\partial h_i = 1 - \beta$, the optimal amount of human capital for a high type merchant is therefore $h_i = \bar{h}$, where \bar{h} is defined by the following condition:

$$\frac{n}{\Psi\Gamma\lambda} \frac{\partial e(\pi_H, \bar{h})}{\partial \bar{h}} = -\frac{\partial P(L|\theta_{i,j})}{\partial \theta_{i,j}} (1 - \beta). \quad (8)$$

It follows that $\hat{h} > \bar{h}$. Equation 8 shows that the size of β linearly determines how far away \bar{h} is from \hat{h} ; in other words: $\bar{h} = (1 - \beta)\hat{h}$. The the average or expected contract a high ability merchant can employ is therefore $\bar{\theta} = (1 - \beta)\bar{h} + \beta h^* = (1 - \beta)^2 \hat{h} + \beta h^*$. The average contract employed by all merchants active in the credit market is equal to $(1 - \beta)\bar{\theta} + \beta\theta^*$ which is equal to $(1 - \beta)^3 \hat{h} + \beta^2 h^*$ as stated. \square

Proposition 1 states that if the usury laws are sufficiently sophisticated so as to prevent all but the most profitable merchants from employing formal credit, then the merchants who do use formal credit will invest in high levels of human capital in order to write contracts that enable them to evade the law. Relative to this equilibrium, if the usury laws are less sophisticated so that both high and medium ability merchants borrow, and lend at interest, then high ability merchants will lower their own investment in human capital because there is some probability that they will be matched with a merchant who is less able than they are. Now we have consider the decisions of the Church by examining the subgame that begins at period $t = 1$. This enables us to establish the conditions under which either equilibria exists.

We can show that an interior equilibrium exists when the following condition holds:

$$1 - \beta \geq \sqrt{\frac{(1 - \eta)\Psi}{2\eta}} \leq 1. \quad (9)$$

This can be formulated as the following proposition.

PROPOSITION 2: There exists at least one interior equilibria when equations 6, 7, and 9 are satisfied. Among them are the candidate equilibria in proposition 1.

Proof. The first order conditions of the Church's maximization problem (equation 1) with respect to L are as follows:

$$(1 - \eta)A \frac{\partial \gamma(L)}{\partial L} + \eta \frac{\partial S(\gamma(L))}{\partial \gamma} \gamma^*(L) \frac{\partial \gamma}{\partial L} = 0. \quad (10)$$

In order to derive a solution for γ^* we evaluate this using $S = -\gamma^2$. Hence the optimum equation 10 can be rewritten as:

$$\gamma^*(L) = \sqrt{\frac{(1 - \eta)\Psi}{2\eta}}. \quad (11)$$

It follows that if this value is compatible with the actual amount of usury obtaining in society: $\gamma \in (1 - \beta, 1)$ then the Church's choice of L^* is consistent with the choices of the merchants in either of the two candidate equilibria considered in proposition 1. \square

This condition establishes that the optimal level of usury is falling in the value attached to eliminating usury η and increasing in the overall level of commercialization Ψ .

We can use this expression to establish the find the conditions under which either one of the two interior equilibria we have considered will obtain. The Church can choose to make the usury prohibition simple: $L = L^S$ or it can make the law comparatively complex: $L = L^C$. The Church's choice of L determines whether or not it is worthwhile for medium ability merchants to enter the market thus effectively selecting between the two candidate equilibria:

$$L^* = \begin{cases} L^S & \text{if } 1 \geq \sqrt{\frac{(1-\eta)\Psi}{2\eta}} < 1 + \alpha & \text{Simple: high and medium types use credit} \\ L^C & \text{if } 1 - \beta \geq \sqrt{\frac{(1-\eta)\Psi}{2\eta}} < 1 & \text{Complex: only high types use credit} \end{cases}$$

Proposition 2 implies that corner equilibria are possible when γ^* is not between $1 - \beta$ and 1 . If η is sufficiently low or Ψ is sufficiently high then the optimal level of usury is equal to $1 + \alpha$. In this case all types of merchants enter the credit market. This equilibrium can be called the *Laissez Faire* equilibrium. The market is comparatively competitive and rife with usury. It obtains if the Church sets $L = 0$. Similarly if η is close enough to 1 and Ψ is sufficiently low then the optimal amount of usury is 0 . This equilibrium is simply called the *No Usury* equilibrium in corresponds to a society which is sufficiently small and uncommercial not to use formal credit at all. This occurs if the Church sets $L = L^{Max}$.

We can now examine the corner equilibria. In the *Laissez Faire* equilibrium when $\gamma = 1 + \alpha$, low ability types by definition invest $h_L = 0$. Their payoff is given by $\pi_L = (\Gamma\lambda(P(L|0)))/(3\Psi n)$ Since $\gamma^* \geq 1 + \alpha$, it is in the Church's interest to prevent any merchants from entering the credit sector therefore it sets $L = 0$. This means that neither high types or low types have an incentive to acquire human capital. When $\gamma^* < 1 - \beta$, the optimal level of usury is zero. In this situation the Church increases L to such a level that it is not worthwhile for any merchant to enter the credit market.

III WELFARE

This section evaluates the four equilibrium in turns of the payoffs merchants receive. It does not discuss overall social welfare. It details the information summarized in table 3. In the *Laissez Faire* equilibrium merchants receive payoffs equal to their level of profitability scaled by the level of commercialization in society at large Ψ divided by the level of competition: $U_i^M = (\Psi\pi_i)/3$ for all $i \in (N)$ such that $\pi_i \in (L, M, H)$.

In the *Simple* equilibrium both high and medium ability merchants will be able to evade it by acquiring human capital. The total amount of credit in the economy will be equal to $\gamma^* = 1$. Low ability merchants will not lend and therefore will earn a payoff of zero. Medium ability merchants obtain $U_M^M = 0$ because at L^S they are indifferent between entering and acquiring $h = h^*$ and not entering. Only high ability merchants make positive profits: $U_H^M = (\Psi\pi_H)/2 - (\Gamma\lambda)/(n)P(L|\theta) - e(h, \pi_H) \geq 0$.

If the Church increases the sophistication of the law from L^S to L^C only high ability merchants will be able to lend. In the *Complex* equilibrium they receive: $U_H^M =$

$\Psi\pi_H - (\Gamma\lambda)/(n)P(L|\hat{\theta}) - e(\hat{h}, \pi_H) \geq 0$. In order to establish whether or not high ability merchants benefited from increased regulation we have to compare these payoffs to those obtained under no regulation ($L = 0$) and mild regulation (L^S). Clearly both low and medium ability merchants become worse off as a result of usury laws as their profits go to zero. The effect of regulation on the most profitable strata of merchants is however ambiguous.

It is possible that high ability merchants get higher payoffs under the *Simple* equilibrium than they do in *Laissez Faire*. Mild regulation is better than no regulation for high ability merchants if and only if the following is true:

$$\frac{\Psi\pi_H}{6} > \frac{\Gamma\lambda P(L^S|\bar{\theta})}{n} + e(\bar{h}, \pi_H) \quad (12)$$

This states that if the additional profits that a high merchant can earn under a mild regulatory regime are sufficiently large relative to the chances of being convicted as a usurer and the effort required to acquire human capital.

The welfare of high ability merchants may be higher under the *Complex* equilibrium than in the *Simple* equilibrium. Furthermore it can be the case that a high ability merchant prefers no regulation to mild regulation but strong regulation to mild regulation. Merchants prefer the law to be sophisticated rather than simple if the following condition holds:

$$\frac{\Psi\pi_H}{2} \geq \frac{\Gamma\lambda}{n} [P(L^C|\hat{\theta}) - P(L^S|\bar{\theta})] + e(\hat{h}, \pi_H) - e(\bar{h}, \pi_H) \quad (13)$$

This states that if the incremental gains in profits high ability merchants enjoy when the usury laws are sophisticated are large relative the net costs imposed by stricter and more sophisticated regulation. The net costs of regulation comprise the additional cost of acquiring more human capital $e(\hat{h}, \pi_H) - e(\bar{h}, \pi_H)$ plus the difference in the probability of being convicted in either state.

Condition 12 was comparatively restrictive. High ability merchants worse off under mild regulation than under *Laissez Faire* may nonetheless be better off under the *Complex* equilibrium. High ability merchants indifferent between L^S and $L = 0$ will be in favour of L^C if the following condition holds.

$$\frac{\Psi\pi_H}{3} \geq \frac{\Gamma\lambda}{n} P(L^C|\hat{\theta}) + e(\hat{h}, \pi_H) \quad (14)$$

We can state this as a proposition.

PROPOSITION 3: The utility of high ability merchants is maximized under the *Complex* equilibrium if conditions 13 and 14 hold.

If there is a usury prohibition, high ability merchants gain from the law L being sophisticated $L = L^C$ so long as the costs of acquiring additional human capital \hat{h} is small relative to the costs of acquiring \bar{h} , the benefit of acquiring this additional human capital in terms of lowering the probability of convict is large enough, and the incremental profits gained as a result of reduced competition are sufficiently high.

L^*	Equilibrium	Usury	U_L^M	U_M^M	U_H^M
$L = 0$	<i>Laissez Faire</i>	$\gamma^* = 1 + \alpha$	$\frac{\Psi\pi_L}{3}$	$\frac{\Psi\pi_M}{3}$	$\frac{\Psi\pi_H}{3}$
L^S	Simple	$\gamma^* = 1$	0	0	$\frac{\Psi\pi_H}{2} - \frac{\Gamma\lambda P(L^S \hat{\theta})}{n} - e(\bar{h}, \pi_H)$
L^C	Complex	$\gamma^* = 1 - \beta$	0	0	$\Psi\pi_H - \frac{\Gamma\lambda P(L^C \hat{\theta})}{n} - e(\hat{h}, \pi_H)$
L^{Max}	No Credit	$\gamma^* = 0$	0	0	0

Table 3: Merchant Payoffs

IV IMPLICATIONS

The results of the model are summarized in table 4. These results have a number of historical implications. Four comparative statics results stand out.

IMPLICATION 1: *Contractual Complexity* The prohibition against usury is associated with more complex contracts being employed. As L increases the level of contractual complexity increases. When $L = 0$, no merchants acquire human capital and all contracts are simple. When L increases to L^S , merchants with medium ability enter the credit market and use moderately sophisticated contracts $\theta_{i,j} = h^*$ in order to reduce the probability of being convicted as usurers. High ability merchants use more complex contracts equal to $\theta_{i,j} = \bar{h}$ when they are matched with other high ability merchants and moderately sophisticated contracts equal to h^* when they trade with medium ability merchants. As L increases until it is equal to L^C only high ability merchants participate in the formal market and they use they sophisticated contracts equal to $\theta_{i,j} = \hat{h} = 1$.

IMPLICATION 2: *Commercialization* As the level of commercialisation Ψ increases, the optimal level of usury also increases as does the sophistication of the law L^* . Ψ is positively related to L^* because the higher the level of commercialisation, the more the Church can 'afford' to repress capital markets. This casts doubts on the arguments of historians who have suggested that usury prohibitions must have weakened as a result of the increased levels of commerce in the high medieval period. In section III we will present evidence indicating that as the usury laws became stricter over the course of the Commercial Revolution that took place in the twelfth and thirteenth centuries.

IMPLICATION 3: *Competition* The higher L^* is the less competition there is in the formal credit sector. This follows from proposition 1. The level of competition in the formal credit sector is indexed by $1/\phi$. The attempts of the Church to reduce moneylending and usury have the additional effect of reducing the level competition because the threat of legal sanctions creates an effective barrier to entry that excludes low ability merchants. Thus if the Church increases the sophistication of cannon law from L^S to L^C the level of competition falls from $\phi = 2$ to $\phi = 1$. If this competitiveness effect is sufficiently large, high ability merchants may in fact benefit from the Church's attempt to eliminate usury despite the fact that it obliges them to expend resources acquiring skills and human capital that they would not otherwise acquire.

Sophistication of Law L^*	Usury γ^*	Competition ϕ	Contracts $\theta_{i,j}$	
L^{Max}	0	-	-	No-one
L^C	$1 - \beta$	Restricted	\hat{h}	High Types
L^S	1	Intermediate	\bar{h}_H and h_M^*	High and Medium Types
0	$1 + \alpha$	Intense	0	Everyone

Table 4

IMPLICATION 4: *Red Queen* Each time merchants attempt to invest in evading the usury prohibition by investing in human capital h , the Church responds by increasing the sophistication of the law L and vice-versa. This implication follows from the fact that legal sophistication L and human capital h are strategic complements in the sense of Bulow et al. (1985). Each merchant using credit finds that the payoff to human capital h increases when the Church increases the sophistication of the law L . When $L = L^C$ high ability merchants choose $\hat{h} > \bar{h}$, the level of human capital they acquire when $L = L^{Mid}$. This is the ‘red queen’ argument. The harder the Church tries to suppress usury, the more effort merchants put into evasion.

This argument is novel. Historians and economists have supposed that increased levels of commercialization and market activity *must* have eroded the atavistic norm against interest. George Akerlof (1976, 609) for example declared that the ‘best example of economic success reducing taboos, is most probably, the elimination of the sanction against the collection of interest’. Similarly Fernand Braudel argued, economic growth and and ‘the gathering speed of the money economy’ made it ‘inevitable that one day ‘vituperable’ usury would be admitted in the open light of day.’ (Braudel, 1979, 1982, 562). Regardless of whether this was true in the long run, it did not hold during the Middle Ages. The immediate response of the Church to growth of capital markets in the twelfth century was an attempt to suppress them.

III THE HISTORY

The implications of the model can be formulated as five historical predictions. These are as follows:

- i. A range of different complex contracts are employed. Different types of merchants used kinds of contracts. Highly profitably merchant bankers used more complicated ways of evading the law than did less profitable merchants. Over time the evolution of contractual innovation respond to the sophistication of canon law.
- ii. Usury laws in the early Middle Ages were lax and unenforceable because it was not in the Church’s interest to attempt to prevent evasion when the level of commercialization Ψ was low.
- iii. As commerce expanded in the twelfth century so did capital markets, and with it, widespread lending at interest. The Church attempted to enforce the usury prohibition in full, increasing L in order to reduce evasion. But the merchants re-

sponded to increases in the sophistication of the law by using different contractual forms and more complex contracts.

- iv. Further, increases in the complexity of contracts $\theta_{i,j}$ are accompanied by increases in the level of educational attainment of merchants participating in credit markets. As a result there is a segmentation between merchants who depend on informal credit, and do not invest in these new forms of human capital, and merchants who do invest in human capital and participate in the credit market.
- v. The usury prohibition reduced the number of merchants able to participate in the formal economy. It restricted the access to credit of those merchants unable to make the necessary investments required in order to successively evade the prohibition and thus adversely affected competition across a range of markets.

THE EVIDENCE

I. THE COMPLEXITY OF CONTRACTS

The simplest way to hide usury was the fictitious exchange. The lender ‘hides loan and interest behind a fictitious sale and repurchase at an impossibly high price by the debtor—a device which still troubled English legislators in early Tudor times’ (Tanner et al., 1929, 492).²⁹ This was nonetheless a crude device. Damages or late payments were other well established and notorious means of charging interest.³⁰ Helmholz (1986) notes that a high proportion of suspect usurers called before the Church courts in England were held to have used this simple form of evasion.

Interest, when it was recorded in account books of merchants in the Northern Italian city-states was noted as *memoriali* or guides to memory.³¹ In those account books, interest was often quite crudely disguised. The rates of interest charged typically varied between twenty and thirty percent. ‘In one memoriali, dated June 6, 1385, the tailor Domenico di Jacopo recorded a loan of f.70 to Marco di Pino from Figline but added that Marco had given him written receipt for a loan of f.90, not the f.70 he actually received—a device often employed to camouflage interest’ (Marshall, 1999, 98).³² International merchants however could use much more sophisticated techniques to evade the law.

The range of contracts that emerge in the equilibrium of the model corresponds to what is observed in the historical record. In this section we consider six different financial innovations that could be used to evade the prohibition. We examine how they functioned, how they were viewed by the Church, and how attitudes to them changed over time.

1. Partnerships
2. Mortgages
3. The sea loan
4. Bills of exchange
5. Lending on exchange

6. Discretionary deposits

Partnerships. Partnerships could take the form of the *commenda* or sedentary partnership or of the *societas*. It is not necessary to argue that these financial innovations were designed with the precise intention of evading the prohibition on usury. Much of the popularity and indeed the usefulness of financial innovations like the *commenda*, or the *societas* can be understood as a response to the strictures of canon law.

The legitimacy of the partnership hinged on the burden of risk. If both partners shared equally in the risk of venture then both were entailed to the resulting gain.³³ More problematic were partnerships in which one partner bore a greater share of the risk since these closely resembled loans. It was on these grounds, the unequal division of risk between partners, that passive partnerships were deemed usurious.

Mortgages and rents. The Church had a similarly nuanced attitude to intertemporal agreements involving land. Rent charges were legitimised in the thirteenth century, though some scholastic writers like Henry of Ghent continued to suspect them. Mortgages however were ruled usurious from the Third Lateran council onwards.

Sea loans. The *foenus nauticum* or sea loan dates from antiquity (Hoover, 1926). They insured against 'the risk of the sea'. The borrower was advanced a sum repayable upon the arrival of the ship. If the ship was lost at sea, the debt did not have to be repaid. It enabled the lender to earn back more than the principle because of the unique risks associated with sea voyages. In the twelfth and thirteenth centuries, merchants began advancing funds on the basis of such sea loans to each other. 'By means of the clever way in which the sea loan was inverted, it was possible to evade the laws against usury, not only for loans for sea commerce but likewise for trading upon the land' (Hoover, 1926, 511).³⁴

Merchants used so-called dry sea loans—loans linked to arbitrary sea voyages—as a subterfuge to disguise usurious loans. Lopez and Raymond note that 'such a contract had much the same advantages as ordinary exchange contracts. Any objection which ecclesiastical authorities might raise was circumvented by the fact that no interest or premium was openly mentioned but rather a rate of exchange which could not be condemned even if it were set in advance to insure a suitable reward for the lender' (Lopez and Raymond, 2001, 1955, 169). Though it was not intrinsically usurious (i.e. it could be used legitimately), the sea loan was deemed usurious by Pope Gregory IX in the *Naviganti*, precisely because it was believed that it was regularly subverted for illicit purposes.

Bills of exchange. The bill of exchange was a way of trading over large distances without the need to physically transfer large quantities of coins (Hall, 1935; Kohn, 1999). Hunt and Murray (1999, 65) describe it as the most important financial invention of the time: 'It avoided the cost of transporting specie, it provided a practical mechanism for international credit and currency exchange'. In addition to this role facilitating remittance, bills of exchange came to be used to extend credit.

The bill or contract of exchange (*cambium*) could be used as a credit instrument because each bill could not be drawn until a fixed length of time had expired after it had been

issued. This fixed length of time before a bill could be redeemed was known as *usance* and depended on where the bill was issued and where it could be drawn.

If the exchange rate between the two currencies was fixed, the bill of exchange simply became a time-dated contract. For a merchant looking to sell a bill of exchange promising x Florins in exchange for y Ducats in time $t + 1$, the bill served the same purpose as a *mutuum*, and the sale was analogous to borrowing money from a lender with an implicit interest rate built into the contract. The bill of exchange thus facilitated the loan on exchange.

The loan on exchange. This was a loan made in one currency and paid back in another currency at a different rate of exchange at a later date at a rate of exchange that was favourable to the lender. A document from Genoa dating from 1188 provides a historical example.

'We, Giordo de Valle and Tommaso de Valle, acknowledge that we have received from you, Beltrame Bertaldo, banker a number of [deniers] Genoese for which [we promise to pay] pounds Provisine to you or your accredited messenger at the next May Fair of Provins. And if we do not do this, we promise to pay you on our next return from the same fair for every 2 [deniers] Provisine 16 [deniers] Genoese until you are fully paid.' (Lopez and Raymond, 2001, 1955, *Document 76*, 166).

The foreign exchange market is used to circumvent the need to explicitly account for interest. There is risk: the lender bears the possibility of adverse currency movements against the Provisine but this was compensated for by charging an exchange rate that was still more favourable for the lender.³⁵

The amount that the borrower has to repay in addition to the principal, and in addition to commissionary fees, depends on the relative price of the currency he wishes to borrow in the two locations, Genoa and Provins. This exchange is called 'dry' because money itself never needs to move between the two locations in question. The implicit interest rate is nevertheless uncertain. Dry exchange remained speculation and there were (rare) occasions where the borrower would end up paying back less than the principal. As a result capital was *diverted* from sectors where it difficult to covertly borrow at interest like domestic industry towards areas like international trade where evasion was much cheaper.

Discretionary deposits. Finally, gifts or adjusted prices could be used to cover the traces of usury. The discretionary deposits was one way of doing this. These deposits were discretionary in two senses: first, the name of the investor was kept secret and second, in return the holding a deposit, the investor received as discretionary gift, which in effect, corresponded to a secret interest payment.³⁶

It is clear that these devices were regarded by contemporaries as means of evading the usury ban. For instance in the *Mirror of the True Penitence*, Fra Jacopo Passavanti (1302–1357) wrote that:

'There are certain cases about which even wise and learned men are in doubt . . . such as usurious contracts, which are so many that one can hardly

understand them. And some men conceal and excuse them under the name of exchange or interest and others with those of deposits or savings. Some call them purchase and sale, or profits of hazards or deferred payments and yet others say they are investments, companies, associations, and other abominable profits.¹³⁷

Contractual innovations made it increasingly difficult to convict suspected usurers. By the fifteenth century, in England lay juries were no longer expected to understand the issue at hand and civic tribunals consisting of the other merchants were often required in order to successfully hear cases of commercial usury (Seabourne, 1998).

The use of such complex contracts increased the transaction costs merchants faced. This increase in cost may have brought some other compensating benefits but these could only be justified because the increase in contractual complexity enabled the merchants in question to evade the usury prohibition. Hence the proclivity of medieval merchants to employ contracts that had the effect of 'reducing financial transactions to commodity transactions' (Riemersma, 1952, 20). The level of contractual complexity responded to the severity with which the Church pursued usury.³⁸ As De Roover noted: 'If it has not been for the usury doctrine, why would merchants have adopted a cumbersome procedure when simpler methods were available?' (de Roover, 1963, 13).

These forms of complex contracts enabled merchants to evade the usury prohibition but they did so by obeying the letter of the law whilst violating its spirit.³⁹ As has been intimated, the extent, to which merchants were prepared to go to evade the taint of usury, is an indication of the cost that the usury prohibition was imposing on the economy as a whole. Thus it was precisely those cities in Italy where contractual lending had extended furthest that were most innovative in devising new types of contracts. In contrast, the cost of the prohibition was smaller in rural England where credit was based on verbal contracts and enforced through witness testimony (Pimsler, 1977; McIntosh, 1988).

II. THE EARLY MEDIEVAL EQUILIBRIUM

In the early Middle Ages, usury was not a significant issue for the Church. Markets were thin; most credit was informal; thus the disruption usually associated with debt, debtors and rich moneylenders, was not perceived to be a wide-spread problem, and as a result, with a few exceptions, the prohibition promulgated in the fourth century seems to have laid in abeyance for several hundred years.

Recorded interest rates were typically very high in this period. For instance 'the Belgian abbot of Gembloux bought at bargain prices the estates of noblemen who had mortgaged them to loan sharks at 100 percent interest' in the eleventh century (Lopez, 1979, 4). But formal lending was rare. Most credit was informal. It was the long period of expansion of the eleventh, twelfth and thirteenth centuries, the revival of the towns, of trade, and of finance that made the issue a live one once again.

Usury itself was condemned only in general terms. There was no attempt to define it (Noonan, 1957, 16–17). It was the long period of expansion of eleventh, twelfth and thirteenth centuries, the revival of the towns, of trade, and of finance that made the

1139	Second Lateran Council	Usury prohibited to laymen as well as clergy (13)†.
1179	Third Lateran Council	Manifest usurers to be excommunicated and denied Christian burial (25).
1215	Fourth Lateran Council	Jewish usurers to be ostracised (67).
1245	Council of Lyon I	Churches forbidden from contracting usurious debts (1).
1274	Council of Lyon II	Usurers to be expelled (26). Bishops who fail to excommunicate usurers to be suspended. (26) Wills of usurers invalidated. Those who upheld the wills of usurers are to be treated as usurers (27)

† Numbers in brackets refer to the relevant canons, constitutions and degrees of the council in question.

Table 5: Sources Tanner (1990); Gilchrist (1969)

issue a live once again.⁴⁰ Church leaders and theologians struggled to understand and impose a system of thought upon the commercial world that had grown up around them.⁴¹

III. THE HIGH MEDIEVAL CAMPAIGN AGAINST USURY

The Church's response to increased commercialisation, falling interest rates, and greater capital mobility, enables us to discriminate between different theoretical explanations of the usury prohibition. In the face of these developments the Church could have acquiesced and allowed the prohibition on usury to become a dead letter. If the usury prohibition was a response to imperfect capital markets, when these capital markets became less imperfect, it would have made sense to relax the prohibition. But this is not what happened.

Table 5 summarizes a number of papal decrees which support the predictions of the model and decisively undercuts the traditional narrative, according to which increasing commerce undermined the prohibition against usury.⁴² The Church sought to *tighten* the usury prohibition. It updated canon law and accommodated the financial innovations of the twelfth and thirteenth centuries in such a way that maintained a distinction between licit and illicit exchange. Canon law became more *sophisticated*. It became better at distinguishing between feigned and genuine exchange and in ferreting out other ways in which the prohibition had been evaded.

In the twelfth century avarice began to replace pride as the 'worst of all vice' (Little, 1971, 16). The punishments levied by the church typically involved penance, restitution

or the denial of spiritual services. Goff (1979, 28) noted a marked increase in the severity of the vitriol directed against usury in the twelve century. In 1139, usury had simply been “ignominious,” but by the turn of the century it had become equated to heresy—an evil that the Church had to devote itself to stamping out.

In 1179 it was deemed necessary to use the threat of excommunication to deter manifest usurers. Whereas previously an alleged usurer had to be accused by an unhappy borrower, in 1207 a change in legislation meant that it became possible to bring a case against a suspected usurer in the absence of a plaintiff. This reduced the likelihood of lender and borrower collusively agreeing to honour interest-bearing contracts. In 1215, the auricular confessional became compulsory thus tightening the grip the Church had on morality. The new mendicant orders, particularly the Franciscans began to actively preach against usury (Little, 1978, 211). In the decretal *Naviganti*, published in 1234, Gregory IX declared passive partnerships to be usurious because the burden of risk was shared unequally. The legislation of the thirteenth century, attests ‘to the proliferation of usurious contracts and to the development of a more precise vocabulary to describe it’ (Armstrong, 2003, 59).

In the scholastic literature of the thirteenth century, usury was equated with theft and murder. Those who associated with usurers, including their wives and children, in addition to their business associates, lawyers and notaries, were also smeared with the crime. Thus Enrico Scrovegini felt it necessary to exculpate not his own sins, but the sins of his father, a notorious usurer condemned by Dante Aligheri in the *Divine Comedy*, by commissioning the Arena Chapel in Padua in 1305 (Derbes and Sandona, 1998). Usurers became smeared with charges of heresy and sodomy.⁴³ The Church’s campaign culminated in 1311–12 with the Council of Vienne, where hidden usury was equated with heresy and sexual perversion, and rulers who tolerated, or profited from the practice, were threatened with excommunication.

A number of scholastic thinkers of the second-half of the thirteenth century attempted to close some of the loopholes that had been opened up by innovative merchants. The sea loan was deemed a vehicle for usury. In his first *quodlibet* Henry of Ghent (d. 1293) even subjected rent contracts to the suspicion of usury.⁴⁴ Bernardino of Siena (1380-1444) argued that exchange by bills was usurious. Santi Rucellai (1437-1497) concurred with this denouncement. Other scholastic thinkers recognized that the judgement that risk bearing contracts were licit enabled lenders to disguise usury. In *De usuris* Giles of Lessines attempted to sever the link between bearing risk and earning a legitimate profit over and above the principal because what mattered was whether or not the contract was usurious in intention. Langholm summarizes these new view as follows: ‘if money of a certain currency is entrusted to a merchant on the condition that a debt in that currency be repaid on the lender’s behalf at a future date, and in a location, when and where the rate of exchange is expected to be less favourable, this is usury because the purpose is profit’ (Langholm, 1992, 315).

Table 6 summarizes the historical predictions of the model. When capital markets were undeveloped in the early middle ages, and recorded interest rates were high, the Church did not have to concern itself with usury and as a result the laws against charging interest on loans were undeveloped and unenforceable. It was the Commercial

Time Period	Capital Markets	Interest Rates	L	Ψ	Contract Complexity
Before 1100	Non-existent	60 % +	$L = 0$	Low	$\theta_{i,j} = 0$
1100-1200	Undeveloped	40 %	L^S	Medium	$\theta_{i,j} \in (h^*, \bar{h})$
1200-1350	Developing	40-20 %	L^C	High	$\theta_{i,j} = \hat{h}$
1350-1550	Developed	20-10 %	L^C	High	$\theta_{i,j} = \hat{h}$

Table 6: Sources (Spufford, 1988; Homer and Sylla, 2005)

Revolution which led to falling rates of interest, and a new prominent role for commerce and finance in society that led to the High Medieval campaign against usury. And it was this campaign against usury that in turn stimulated financial innovation.

IV. HUMAN CAPITAL AND EDUCATION

The mechanism driving segmentation in the credit market is the incentive the prohibition creates for merchants to invest in human capital. Merchants and bankers—there was little distinction between the two during the thirteenth to fifteenth centuries—had to be literate and numerate, and by the fourteenth century, they were expected to be able to keep detailed accounts, understand and make use of the mathematics required for commercial arithmetic, and to have a competent knowledge of the law (Hunt and Murray, 1999).⁴⁵

There is plenty of evidence for the accumulation of human capital. Day (1987) goes so far as to attribute the reemergence of secular education in the West to growth of trade, and settled rather than itinerant merchants. Correspondingly, a career as a merchant required substantial investment in human capital. One instance of this was commercial arithmetic. In the thirteenth century, Leonardo of Pisa pioneered the mathematics of discounting and calculating the present value of an asset and as result ‘Italian businessmen learned techniques of valuation and discounting’ (Goetzmann, 2005, 139).

The education of an Italian business man was practical and vocational. It was not designed with the intention of evading the usury prohibition, but it developed skills, which enabled Italian merchants to know their way around the law.⁴⁶ Boys would learn to read early: ‘A merchant had to be literate, if not in several languages, at least in his own; therefore boys aspiring to the merchant profession attended the basic grammar schools’ (Swetz, 1987, 20). At the age of eleven or so, they would attend a *scuola d’abbaco* where they would learn commercial arithmetic. At the *scuola* they would learn how to ‘establish buying and selling prices, to calculate costs and exchange rates, to convert weights and measures, to work out simple and compound interest, to be able to cast up a ‘simulated balance sheet’ for an operation, and to handle the various instruments of credit’ (Braudel, 1979, 1982, 409).

As in our model acquisition of this knowledge established a barrier to entry. This knowledge was transmitted directly from master to apprentice and this required a substantial investment on behalf of young.⁴⁷ Much of their learning also took place on the job: ‘Here they familiarized themselves with the business, learning to handle

the cash box and eventually to keep accounts' (Goldthwaite, 1972, 418).⁴⁸ Benedetto Cotrugli (1416–1469) in his handbook for merchants observed 'many gentlemen entrust to their [fellow] citizens their own sons, [to be] trained and placed in some good position, so that from childhood they could learn their art' (quoted in Lopez and Raymond, 2001, 1955, 415–416).

This level of education, and the particular form it took, distinguished the prominent bankers of Florence and the other North Italian cities from other mere moneylenders. It was exclusive and 'demanded of the neophyte eligibility by birth, temperament, and ability for trust and for companionship with his seniors' (Reynolds, 1952, 351). Barriers to entry like this had the effect of reducing competition.

V. COMPETITION AND COLLUSION

In the model, usury laws reduce the number of lenders by restricting the number of merchants who can have access to and participate in markets where formal credit is important. The effect of the Church increasing the sophistication of canon law L is to enforce barriers to entry, reduce the amount of competition ϕ and create a monopoly rent.

There is considerable support for this finding in the historical literature. Florentine merchant banking was dominated by a few large families.⁴⁹ Recent research indicates that relations between Florentine merchants were often collusive: 'Florentine merchants were cooperative with and helpful toward their "competitors"' (McLean and Padgett, 2006, 2). This offers a potential explanation for Richard Goldthwaite's finding that competition between merchant bankers in Renaissance Florence 'did not reach the point where they developed the techniques of product variation, cost-cutting, underselling and other cut-throat market practices' (Goldthwaite, 1995, 647).⁵⁰ Nor was this outcome necessarily undesirable from the point of view of the Church: if an industry produces a negative externality, monopolization may be a beneficial and low cost way of mitigating the problems associated with that externality.

Implication 3 has a further prediction. It is difficult to estimate *how* much effect usury laws had on the level of competition. Perhaps medieval financial markets could not have supported many different firms even in the absence of the barriers to entry created by the prohibition on usury? We can tell whether or not these barriers to entry were qualitatively significant by whether or not usury laws were supported by merchant bankers when they were in a position to influence policy.

Florence in the fifteenth century provides a historical test of this prediction. Florence in the 1420s was dominated by the Albizzi family, rivals of the Medici. In 1429, the Signoria banned the *Cambium sine litteris* or exchange of bills and deemed it openly usurious. The official reason given for the prohibition was to protect borrowers from ruin. But it appears likely that it was an attempt to reduce the financial power of the Medici. The Medici bank earned most of its profits through foreign exchange transactions. This Europe-wide money market also served as a capital market since the most important way in which the usury prohibition was circumvented was by transforming credit transactions into foreign exchange transactions via a bill of exchange. (de Roover, 1963,

108–141). The attempt to erode the economic base of the Medici family failed and in 1434, Cosmo de' Medici returned from exile. In 1435 the law was revoked. The *Cambium sine litteris* was again permissible. What is significant is that the Medici, once in power did not sanction lending at interest or usury. Rather they simply reverted back to the *status quo ante*. The usury prohibition as it stood was consistent with a small subset of usurers making supernormal profits (Gutkind, 1938). Merchant bankers were usurers, but they were not against usury laws *per se* since these laws benefited those merchants who were able to evade the prohibition successfully by limiting competition. This supports an important prediction of our model.

ALTERNATIVE HYPOTHESES

In order to check the robustness of the argument developed here, two alternative hypotheses can be examined. Finally as a control for our argument we investigate the development of financial markets in medieval Japan.

TRANSACTIONS COSTS

Perhaps employment of bills of exchange and other complex contracts is better explained by transaction costs? Individual merchants may have invested in education and in innovative new contracts simply because it increased their profitability by reducing the costs they faced or enabled them to get ahead of their competitors.

Usury laws were not the only reason for contractual innovation in the Middle Ages. Bills of exchange were not exclusively used to evade the usury prohibition. Munro (1979, 171) argued that the prevalence of the bill of exchange reflected a number of factors apart from the prohibition on usury: a desire for an investment instrument that unlike the partnership offered limited liability, that could be used to transfer resources across large distances and that could not easily be seized by the sovereign as bullion could be.

Can medieval contractual innovation can be explained the incentives merchants had to reduce transactions costs? Munro acknowledges that the usury prohibition was instrumental in determining the form that bills of exchange took.⁵¹ Furthermore, bills of exchange were used as credit instruments in instances where their employment increased, rather than reduced, the costs of doing business.⁵² Foreign exchange markets came to substitute for capital markets, even though exchange rate fluctuations made the former more risky than the latter, and despite the fact that the loan on exchange required 'complex bookkeeping', a 'network of correspondents' and exposed the creditor 'to loss not only through the insolvency of his debtor, but also through the failure of the correspondent to whom he sends a remittance' (de Roover, 1963, 13). The prevalence of the bill of exchange as a instrument of credit cannot therefore be explained in terms of lower transaction costs.

NOTARIES

Could merchants have hired notaries to write contracts to evade the usury prohibition for them? Merchants would not therefore need to acquire human capital in order to evade the usury

prohibition.

Notarial contracts disguising interest payments do not survive in the records. According to Marshall, tradesmen and merchants in fourteenth century Prato 'never used notarial documents to secure their loan' (Marshall, 1999, 93). The risk of prosecution was non-contractible. A notary drawing up a usurious contract was an accessory to the crime. The ruling of the council of Vienne in 1311 made it official policy to examine the documents of moneylenders in courts meant that notaries involved in drawing up documents used for usurious purposes would have been liable for prosecution. In Marseille in the first half of the fourteenth century, one historian notes, 'Creditors were not allowed carelessness in playing this game. The wise course was never to admit usury—not even orally' (Shatzmiller, 1990, 23). Notaries could not solve the problems thirteenth and fourteenth century merchants faced.

MEDIEVAL JAPAN

One way that this hypothesis can be corroborated is by examining lending practices in late medieval Japan. Japan possessed a complex agrarian economy comparable in terms of urbanization and commercial development to the leading regions of Europe but it lacked a religiously enforced prohibition on usury.

Medieval Japan, like medieval Europe, was an economy heavily dependent on credit. Susan Gay's (2001) study of moneylending in Muromachi period Kyoto found that interest payments was universal. At times the shogunate attempted to limited interest rates for pragmatic reasons but there was no Japanese equivalent to Christian or Islamic usury doctrines. Usury *per se* did not attract particular opprobrium; in fact moneylending in Kyoto was dominated by the the Enryakuji monastery.⁵³

Moneylenders provided many of the functions of banks 'they stored and protected cash and valuables in return for a deposit fee. They also managed their patrons' landed income, performing such services as tax farming and transporting goods from distant estates' (Gay, 2001, 39). Interest was universal.⁵⁴ The range of goods offered as collateral indicates that a wider range of society was participating in credit markets.

While cheques (*kirifu*), promissory notes (*yakusoku tegata*) and commercial bills (*kawase tegata*) did emerge in medieval Japan they were used to surmount the transaction costs involved in conducting long-distance trade in a cash scarce economy and were not used for short-term credit.⁵⁵ Japanese moneylenders did not developed the range of complex lending instruments that were pioneered by Italian bankers. The credit market in Kyoto and elsewhere in Japan remained dominated by small-scale lenders and large-scale banking was slow to develop.⁵⁶ More research needs to be done on developing a full comparison between medieval Japan and medieval Europe but a preliminary comparison is consistent with the argument of this paper.

ISLAM

The Islamic Middle East had a similar prohibition on lending at interest. Contractual innovation similar to that which occurred in Europe also took place in the Middle East during the medieval period. Nevertheless banks did not emerge in the Islamic Middle

East until they were imported from the West in the nineteenth century: ‘Medieval Islamic civilization produced no organizations that could pool thousands of people’s funds, administer them collectively, and then survive the deaths of their managers’ (Kuran, 2006, 13).

Islamic bills of exchange *suftaja* were used to transport funds but unlike in Europe they not were used for foreign exchange purposes and they were not used to evade the prohibition on interest (Rubin, 2008*b*). Rubin (2008*a*) argues that this was because the prohibition against interest was more severe in the Middle East than it was in Europe.¹ The alternative view suggested by this paper is that financial innovation was greater in Europe than in the Middle East precisely because the usury prohibition was particularly strict in Europe. In fact there is evidence suggesting that Islamic prohibitions on usury were easier to evade and less restrictive than the medieval Christian prohibition (Rodinson, 1965, 2007). The prohibition on *riba* has been interpreted as an attempt to prevent debts from snowballing that eventually became a ban on all interest (Kuran, 2006, 14). Nevertheless it was not widely enforced even in the period of the early Caliphate. Islamic law in this area amounted to ‘simply the authorizing of loans at interest, provided that some additional formalities [were] observed’ (Rodinson, 1965, 2007, 67).²

IV CONCLUDING COMMENTS

The usury prohibition was not costless. Nor was the Church as favourable to commerce as historians often claim. Regulations that increase transaction costs not only reduce the total volume of trade, they reduce the proportion of trade conducted in the impersonal sphere, relative to the proportion of trade that is personalised. One consequence of the prohibition was to divert creditors away from the formal sector, and to prolong their participation in the informal credit sector. This is costly because though personal and impersonal credit markets are substitutable, they are far from perfect substitutes.⁵⁷ Formal contracts enable traders to economise on personal exchange, and thus allow the volume of trade to expand and with it, the division of labour to increase.⁵⁸

Greif (1993, 1994, 2006) argued that distinctive individualistic culture of the Genoese led Genoese merchants to rely upon contracts rather than informal means of transmitting information in order to overcome agency problems. He went on to claim that cultural beliefs have path dependent properties. According to Greif, ‘collectivist and individualist cultural beliefs are likely to motivate the introduction of different organisations. Once an organisation is introduced for specific reasons, it is likely ... to lead to

¹He argues that in Islam usury was condemned twice over: by the secular authorities as well as by the religious authorities whereas in Europe after the thirteenth century, secular authorities began to regard some forms of interest as legitimate.

²Udovitch (1975, 10) argued that the various forms of partnerships that proliferated during this period ‘adequately, flexibly and licitly fulfilled the economic function of an interest-bearing loan’. In the late medieval period, in the Ottoman empire (Pamuk, 2004, 11) likewise notes that the prohibition on interest did not prevent credit expanding. The cash waqf was ubiquitous (Mandaville, 1979). This was an institution that enabled charitable foundations to directly earn interest. By studying judicial records from seventeenth century Anatolia, Jennings (1973) has shown that credit markets flourished in the Ottoman Middle East and that Muslims were active participants in them.

other organisational innovations through learning and experimentation and as existing organisations direct responses to (historically) subsequent contractual problems' (Greif, 1994, 941).

This paper has argued that it was precisely the development of impersonal and contract-based trade that explains why the usury prohibition was first revived and then reinvigorated and strengthened during the twelfth and thirteenth centuries with the concomitant consequences that have been documented in the body of the paper.

It has demonstrated that in shaping the development of contractual forms, the usury prohibition shaped the character of medieval capital markets. The costs it imposed affected the transition from personal credit to impersonal capital markets. The costs of the usury prohibition were greatest in Italy. And consequently it was in Italy that merchants went to the greatest lengths to avoid being accused of usury. The Florentines in particular were thought to be ingenious in evading the usury prohibition. Italian methods went on to influence the rest of Europe. From Italy these techniques spread across Western Europe.⁵⁹

The argument of this paper indicates that the usury prohibition probably benefited profitable and educated merchant bankers who were able to successfully evade prosecution as usurers, and who were able to use the law to protect themselves from competition. De Roover (1963) goes further and argues that the prohibition must have retarded economic growth. Undoubtedly the usury prohibition must have imposed severe costs; paradoxically however, it may have brought with it longer term benefits, through two different channels.

First: in the model the usury prohibition stimulated the accumulation of human capital amongst merchants. Merchants had to acquire new skills. The resulting demand for secular education was an important factor in the establishment of schools in commercial centres like London, where the 'grocers had from the twelfth century three good City schools where their sons could learn French and Latin' (Nightingale, 1995, 375). Early medieval Europe had been largely illiterate and literacy and numeracy are important correlates of economic growth.⁶⁰

A second channel may have been still more important. According to the logic of our argument, the usury prohibition should have, and did, stimulate financial innovation. Innovation in contractual forms and in financial instruments not only enabled merchants to better avoid detection as usurers, it also enabled them to trade more easily and to spread risk more effectively. But since the benefits of a new financial innovation quickly accrue to a wider set of the population than the initial innovator or innovators, the social benefits of innovating typically exceed the private benefits. Innovation in contractual forms is thus marked by an even severer problem of under provision than are other forms of innovation. In general, the fact that financial contracts are usually standardised indicates the costs of innovation. As Franks and Sussman (2005) puts it:

'The very phenomenon of contract standardization is an indication of a significant cost of innovation. Had the cost of innovation been low, we would observe the parties to each transaction writing their contract *de novo*, or at least having a large set of differentiated standard instruments' (Franks

and Sussman, 2005, 290).

Financial systems are inherently conservative for this reason. Initial conditions determine the type of financial contracts that exist; these become standardised and future entrepreneurs have little incentive to innovate and devise new contractual forms.

In giving merchants, an additional private incentive to innovate, this usury prohibition 'jolted' the preexisting equilibrium; it brought private and social benefits closer together, and thus partially meliorated the problem of under provision. It led to a flurry of inventions which we have documented. Furthermore *à la* Greif et al. (1994) a culture of financial innovation lowered the costs to further innovations in other related fields.⁶¹ Perhaps de Roover had a similar argument in mind when he wrote: 'the usury prohibition had a tremendous influence on business practices all through the Middle Ages, the Renaissance, the Reformation period, and even down to the French Revolution' (de Roover, 1974, 185).

NOTES

¹C.f. North (1981); Rosenberg and L.E. Birdzell (1986); North (1990); Olsen (1993); Rodrik et al. (2004)

²C.f. North (1981); Jones (1981, 1988); Lal (1998); Maddison (2003); Greif (2006); van Zanden (2007).

³C.f. Britnell and Campbell (1995); Masschaele (1997).

⁴Braudel similarly noted: 'everything seems to have been there in embryo: bills of exchange, credit, minted coins, bank, forward selling, public finance, loans, capitalism' Braudel (1979, 1984, 91).

⁵ Largely beyond the scope of this paper, is a fourth question: why did the Church prohibited usury? Economists have speculated about the origins and the reasons for medieval usury laws. Glaeser and Scheinkman (1998); Reed and Bekar (2003); Rubin (2008c) hypothesize that the usury prohibition was important because it either reduced inequality or aided consumption smoothing technologies. Ekelund et al. (1996) develops a rent-seeking explanation claiming that the Church benefited materially from the prohibition.

⁶De Roover argued that the 'usury prohibition should be taken more seriously than it usually is. One should not assume that the canonist doctrine on usury was merely a topic for academic discursion among theologians' (de Roover, 1974, 185). C.f. de Roover (1942, 1944, 1946, 1967, 1974). The standard view amongst economic historians was expressed by Charles Kindleberger who noted that the subject belonged 'less to economic history than to the history of ideas' (Kindleberger, 1980, 218).

⁷This transformation entailed the replacement of the 'peripatetic merchant moving around western Europe and the Mediterranean with his goods' by 'several different men with specialised functions' (Spufford, 2002, 22).

⁸C.f. Temin (2004) for ancient Rome; Habib (1964) for medieval India; Gay (2001) for medieval Japan; Yang (1952) for imperial China. Habib concludes that 'Usury flourished in medieval India with the full sanction of the State' (Habib, 1964, 413)

⁹In contrast, a *commodatum* contract or a loan involving non-fungibles like a house could involve a return in excess of the principal because it was a loan for use, and thus could be viewed as a lease (Armstrong, 2003).

¹⁰'*Mutuum date nihil inde sperantes*' (Luke 6.35).

¹¹For more detail see (Langholm, 1992, 1998; Armstrong, 2003, 2007; Munro, 2008).

¹²*Summa aurea in quattuor libros Sententiarum*. III. 48, 1, 2, pp. 913–14 (quoted in Langholm, 1992, 85).

¹³This poses problems for the pragmatic explanations of the usury prohibition offered by Glaeser and Scheinkman (1998) and Reed and Bekar (2002).

¹⁴As Odd Langholm notes: 'Usury as a sin is to receive such an increment or to lend with the intention of receiving it. Condemnation of sinful intent may not seem particularly relevant to economics ; it is indirectly of some interest because of the type of authority that can be brought in to support it and thereby support condemnation of the act as well' (Langholm, 1992, 46).

¹⁵Helmholz (1986, 367) examined found that 'usury cases formed a regular part of ecclesiastical jurisdiction throughout England'.

¹⁶*The Codex Justinianus*, recovered in the eleventh century, and the source of Roman Law, permitted rates of interest below twelve percent. Jews were licensed to lend at interest in most jurisdictions (Chazen, 1973–1974, 2006). Seabourne (1998, 2003) examines the prosecution of usury in Royal courts in fifteenth century England.

¹⁷The term 'campaign against usury' comes from Chapter XV of Baldwin (1970, 296–311) and was originally used to describe the period 1195–1215. But Munro (2003, 2007) extends it to include a period from the late twelfth century until the middle part of the fourteenth century and this is the sense in which it is used here.

¹⁸Also see Spufford (2002, 46) who argues that the "The falling of commercial interest rates in the principle cities of Italy in the course of the thirteenth century, from 20 % per annum and more to 10 % per annum and less, is a very clear indications of the change in scale of the money supply'. The rates charged by pawnbrokers were considerably higher.

¹⁹C.f. Khalil (1997) entitles all games with this feature red queen games after the character in Lewis Carroll's *Through the Looking-Glass*.

²⁰C.f. McCloskey and Nash (1984); Clark (2007). McCloskey and Nash argue that the 'prohibition of usury was irrelevant: that the sin of taking interest should be committed frequently is no more surprising than that the sin of adultery was' (McCloskey and Nash, 1984, 183). Clark claims that the ban on usury 'had very little cost to preindustrial Christian society'. He goes on to argue that 'Usury laws survived so long in England because they imposed very little restriction on the economy' (Clark, 2007, 216–17).

Clark's view is unsubstantiated. Many of the 'exceptions' Clark lists and which he considers 'well accepted in Christian Europe' were in fact regarded as highly dubious by the authorities. Thus in the following letter by Pope Alexander II to the Archbishop of Genoa concerning time dated contracts, quoted by André Lapidus, the Pope answers that 'Although arrangements of that kind and of that form could not strictly be called usury, sellers are nevertheless exposed to being considered as guilty, unless they could really doubt the plus or minus values of the commodities at the time of payment' (quoted in Lapidus, 1991, 33–34). The use of late charges to extract interest for instance was condemned by Johannes Calderinus (d. 1365), Antonius de Butrio (d. 1406), and Peter of Ancharano (d. 1416) as *lucrum cessans* (Armstrong, 2003).

²¹Adam Smith understood this when he observed that '[w]hen the law prohibits interest altogether, it does not prevent it. Many people must borrow, and nobody will lend without such a consideration for the use of their money as is suitable not only to what can be made by the use of it, but to the difficulty and danger of evading the law' (Smith, 1976, 1776, 1.ix. 19).

²²Robert Lopez argued that the restrictions against usury 'were never a major hinderance to the growth of credit institutions' (Lopez, 1979, 22). This view dates back to Ashley (1888, 1893) at least.

²³It is true that as McGovern (1972) argued after 1200, canon lawyers evidenced a more favourable attitude to private property in commerce in general. But credit, lending and usury remained different.

²⁴Kimball (1988); Coate and Ravallion (1993); Kocherlakota (1996) have used the folk-theorem to demonstrate why such practices are incentive compatible.

²⁵Usury was distinct from other forms of unjust profiteering which were termed *turpe lucrum*—filthy gain. Tausch (1952, 298) notes that 'Shylock's behaviour was reprehensible, not merely because the

“bond” he demanded was a pound of flesh, but also because it was forfeit at a certain time regardless of the fact that Antonio’s vessels lay “wrecked on the narrow seas”.’

²⁶All merchants were involved in credit. There was no strict division of labour between different types of creditors. Luzzatto notes that during ‘the Middle Ages moneylending at interest was practised not only by bankers and money-changers, but also, to even greater extent, perhaps, by merchants’ (Luzzatto, 1961, 133).

²⁷The model is a reduced form model because the following details are embedded inside it. Suppose each period t can be subdivided into t_1 and t_2 . A credit contract is a binding agreement specifying that individual i extends resources x to individual j at time t_1 on the condition that j pays i $(1 + r)x$ at time t_2 .

²⁸This evident from:

$$\frac{\partial \theta_{i,j}}{\partial h_i} = \begin{cases} 1 & \text{if } h_j \geq h_i \\ 0 & \text{if } h_i > h_j. \end{cases}$$

²⁹Nightingale (1995, 374) details a number of cases where interest rates of up to thirty-three percent per annum were charged through such ‘false chevissance’ to English grocers in early fifteenth century London.

³⁰According to (Rabinowitz, 1944) these devices may first have been used in antiquity to enable Jews to borrow at interest from other Jews. He observes that in the medieval period ‘the device of disguising interest payments under the form of damages and expenses was used extensively by Jews and non-Jews alike’ (Rabinowitz, 1944, 52).

³¹In fourteenth century Prato, we have direct evidence that small-scale lenders typically just left the interest payment off the books. As Marshall notes ‘only the person who benefited from usury needed to fear prosecution’ (Marshall, 1999, 115). And this means that we do have records of interest-bearing loans which otherwise would not have survived. In this respect, the records of Matteo di Matteo Toffi, a broker and small-time moneylender, are of particular interest because he recorded the loans of a number of his clients all made at a rate of interest that varied from twenty-five to thirty percent. Interestingly his records also ‘lists four loans that he made personally to Luparello di Verzoni, without any mention of interest rates of maturities’ unlike the ‘other loans recorded in his book in which he was not a party’ (Marshall, 1999, 55).

³²The same practice took place in Marseille ‘To evade prohibitions against usury—and to enable these documents to be considered in ecclesiastical courts—the parties would pretend that a certain sum was being given out, the same sum to be returned on a specified date’ (Shatzmiller, 1990, 23).

³³Needless to say, the that full partnerships were approved by the Church does not imply that the usury doctrine imposed only trivial restrictions on contractual form. As Frederick Lane noted ‘Full partnership had the disadvantage, however, that it involved the investor in liabilities that were theoretically unlimited and of which the practical range was difficult to foresee’ (Lane, 1966, 57).

³⁴C.f. De Lara (2001, 2002).

³⁵Where exchange rates fluctuated, as they did in medieval Europe, this difference was uncertain but its sign was usually predictable thus enabling the lender to make back more than his original loan. The difference between the exchange rates depended on the balance of trade and the flow of specie between the two locations (de Roover, 1974). This in turn hinged upon predictable matters such as the seasons which governed the pattern of shipping. Mueller describes this as ‘fixing the rules of the game’ (Mueller, 1997, 293). Thus in 1190, Guglielmo Riccuomo and Egidio de Uxel recieved ‘an amount of exchange,’ a *cambium* for which they they promised ‘to pay to you or to your accredited messenger 69 Pavese by mid Lent’ (quoted in Lopez, 1951, 164).

³⁶St. Antoninus condemned the practice of using discretionary deposits in the following terms.

'The nobles, who do not wish to labor, lest money be lacking to them as they gradually consume it, give it to a merchant or a money-changer, principally intending to receive something annually at their [the depositories'] discretion, the capital, however, being kept safe. And although they call this a deposit, yet it is clearly usury' (quoted in Noonan, 1957, 174).

³⁷Quoted in and translated by Origo (1957, 150).

³⁸C.f. Tan (2002, 186)

³⁹While this behaviour might enable a lender to avoid temporal sanctions, it would not save him from divine punishment. Thus a commentary on the Decretals, *The Glossa ordinaria to the Decretum Gratiani*, makes the following distinction: 'although the church may not judge [a lender] a usurer on the basis of the contract's form, nevertheless God will punish him as a usurer by reason of intention unless he makes restitution. In this way a person might be usurer in the eyes of God but not in the eyes of the Church' (quoted in Armstrong, 2003, 86).

⁴⁰A number of scholars have suggested that it was the rediscovery of Aristotle that reinvigorated the Church's attitude to the topic but the reinvigoration of the campaign against usury predates this (Langholm, 1984). See Munro (2008, 977–979) for a summary of the importance of Aristotelian philosophy on the usury doctrine.

⁴¹Pirenne regarded 'the Church's conception of the world' to be 'admirably adapted to the economic conditions of an age in which land was the sole foundation of the social order' (Pirenne, 1936, 13). Since the Church was the major landowner in most of Europe, it was 'easy to see how well these principles harmonised with the facts and how easily the ecclesiastical ideal adapted itself to reality. It provided the justification for a state of thing by which the Church itself was the first to benefit' (Pirenne, 1936, 14). As commerce recovered, the wealth of the bishop became rivaled by the wealth of the town. The relative importance of the Church in medieval economic life declined as Pirenne (1925) argued. In this analysis the campaign against usury can thus be understood as part of a wider attempt by the Church to establish the limits of legitimate commerce and the boundaries of commercial morality. It is this concern which explains at least in part, the time and effort devoted to the problem of usury. A similar process of debate and clarification occurred with respect to other areas of commercial life. Speculation and creating artificial scarcities were also condemned (Langholm, 2006). Merchants who engaged in this form of arbitrage for necessities were condemned.

⁴²Rubin (2008a) is mistaken to date a weakening of the usury prohibition to the thirteenth century.

⁴³In Pistoia, a usurer was branded twice with a cross as a heretic (Origo, 1957, 153).

⁴⁴Perhaps under pressure from the authorities he later changed his position on this Langholm (see 1992, 273). Gervais of Mont-Saint-loi also opposed fixed period rent contracts.

⁴⁵Pirenne (1936) attributed the rise of vernacular languages in Italy and in Flanders as written languages, taught in schools to the influence of merchants. 'The advance of education appears to have been intimately connected with that of credit, and the example of Italy shows that the further credit was developed, the more rapid was this advance' (Pirenne, 1936, 125).

⁴⁶According to Goldthwaite (1972, 418), 'the education of the son of a Florentine patrician was directed towards his professional goals—business in one form or another'.

⁴⁷These investments required scale economies. The city of Lucca in 1345, hired an *abbachista* or arithmetic teacher out of the public purchase on the grounds that the citizens were 'much engaged in business' (Spufford, 2002, 30). Such an investment would have much less likely outside the commercial centers of Northern Italy.

⁴⁸Marco Datini served such an apprenticeship in Florence from the age of thirteen (Jouanique, 1996, 264).

⁴⁹McLean and Padgett (1997) tested and rejected the hypothesis that Florentine financial markets were perfectly competitive on the basis of data from the 1427 *catasto*.

⁵⁰C.f. Bergier (1979).

⁵¹As Munro acknowledges: 'For the bill of exchange and credit instruments in general, the usury ban effectively precluded open discounting and thus prevented them from becoming fully negotiable devices until more modern times' (Munro, 1979, 171).

⁵²C.f. Mueller (1997, 289).

⁵³In Kyoto in 1425-26, 70 percent of brewer-lenders had clerical status.

⁵⁴For instance in 1459, a 20 month loan on the basis of vases or cutlery as collateral was carry interest of no more than 6 percent per month (Gay, 2001, 48). Annually, these interest rates amounted to 60 or 70 percent.

⁵⁵The Japanese state did not mint its own coinage until 1636. In a recent study of credit in medieval Japan Sakurai (2008) concludes that 'the use of drafts was a means of making the settling of accounts simpler and more efficient by coordinating credit-debt relations, but it was not a method that evolved from a metal money economy, but rather a measure that emerged from an economy based on commodity money as a way to alleviate the burden of transporting commodities' (Sakurai, 2008, 67).

⁵⁶There were at least 350 brewer lenders in fifteenth century Kyoto.

⁵⁷Development economists have examined the linkages between informal and formal credit markets in detail (see Bell, 1990). Informal credit an impediment to economic growth according to Bhaduri (1973, 1977). But attempts to displace informal lending have typically failed. Many firms in developing economies depend on both informal and formal credit (Jain, 1999). The formal sector is more liquid but informal lenders typically have informational advantages. Smaller producers however are often excluded from the formal sector altogether (Bose, 1998). Reciprocal arrangements based on internal or multilateral sanctions can effectively support a *certain* level of trade but they cannot support an *efficient* level of trade because such arrangements are based upon excluding strangers with whom it would otherwise be possible to engage in mutually beneficial trade.

⁵⁸As John Nye notes: 'the existence of improved institutions such as courts, written law and contracts, and the development of improved mediating organizations permit us to economize on our personal exchange and to save our personal attention for those matters of higher significance such as friendship, marriage, or even high-level business transactions ... it is likely that we exchange in almost as many personalized exchanges as our ancestors' (Nye, 2008, 74).

⁵⁹'The English merchants who sold or who bought from Italians, or who trafficked with them in foreign currency or for credit, learned from the Italians how to cover bits of parchment with business formulas, which were highly precise and universally understood. The particular form of Italian letter instructing payment abroad in foreign currency, the *tratta*, became the model for the English letter of exchange' (Postan, 1951, 342).

⁶⁰Blum and Dudley (2003, 223) note that 'by 750 in Western Europe, the use of writing had declined compared to Roman and even Merovingian times ... lay education had become increasingly rare'.

⁶¹Further evidence of financial innovation in the Italian city states is provided by Fratianni and Spinelli (2006).

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