PRINTING AND INTEREST RESTRICTIONS IN ISLAM & CHRISTIANITY:

AN ECONOMIC THEORY OF INHIBITIVE LAW PERSISTENCE*

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Abstract

Until recently, many scholars attributed the divergence in Middle Eastern and Western European economic development to the "conservative nature" of Islam. This paper departs from such scholarship, suggesting that institutions supporting economically inhibitive laws are more likely to be self-enforcing in the Muslim world – providing an *appearance* of conservatism. A theoretical model inspired and substantiated by the history of interest and printing restrictions in Islam and Christianity suggests that this outcome emanates from the greater degree to which Islamic political authorities derive legitimacy from the dictates of religious authorities.

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I. INTRODUCTION

Over the past few decades, a significant amount of research has been conducted in search of the causes underlying the "rise of the West" (North and Thomas 1973; Jones 1981; Diamond 1997; Landes 1998; Pomeranz 2000; Acemoglu, Johnson, and Robinson 2005; Greif 2006). In relation to the Middle East, this research takes on a special significance. By almost any account, the Middle East was far more advanced economically and scientifically than Western Europe as late as the thirteenth century. Yet, Middle Eastern economies did not develop nearly as rapidly as Western European ones did in the ensuing centuries, and were far surpassed economically after the Industrial Revolution.[1] Maybe, then, instead of searching for the factors underlying the rise of the West, the correct question to pose is the converse one Bernard Lewis (2002) suggests: "What went wrong?"

Until recently, popular explanations for the economic divergence suggested that the "conservative" or "mystical" nature of Islam discouraged curiosity (to learn non-Muslim languages or European cartography, take foreign expeditions, adopt foreign methods and techniques, and so forth) and prevented risk-taking, innovation, and mechanization (Cromer 1908; von Grunebaum 1966; Weber 1978; Lewis 1982, 2002). In this view, Islam is seen as inherently hostile to commerce and finance.[2] Yet, arguments appealing to the "conservative nature" of Islam often overlook (or ignore) an important feature of Muslim history – from the 7^{th}-10^{th} centuries (C.E.), Islamic contract law, finance, and provision of public goods (to name

[1] Throughout this paper, I will use the terms "Christian world" and "Western Europe" to denote the pre-Reformation Christianized regions under the Church of Rome. I will also use the term "Islamic/Muslim world" somewhat broadly, comprising North Africa and the "Middle East" (that is, the entire Arab world, Iran, Turkey, the Balkan peninsula, and Spain up to the Reconquista). Muslim regions of Central Asia, the Indian subcontinent, and the Malay Peninsula are not the direct focus of this paper, though the results are applicable to these regions.

[2] For an overview of this literature, see Kuran (1997, p. 49-53). Said (1978) gives a fascinating historical account of Western views towards the "Orient", and in particular, the Middle East. Lerner (1958, p. 405) argues that the top policy problem (of the 1950s) for Middle Eastern leaders was the choice between "Mecca or mechanization". Also see Mokyr (1990).

just a few) were consistently modified in reaction to the exigencies of the day. Thus, there appears to be nothing in Islam *inherently* hostile to commerce.

While on the surface these explanations appear to be purely cultural in nature, there are empirical phenomena that could lead one to believe their validity. In particular, there have existed numerous laws in both religions – such as prohibitions on taking interest and printing, suppression of women, and laws against mass education – which have inhibited economic development. Although these laws were equilibrium outcomes in the pre-modern settings in which they emerged, they have persisted for much longer in Islam than in Christianity despite changing circumstances under which they inhibited economic activity.

This paper seeks the *general* forces underlying the historical paths of such laws in Islam and Christianity. I begin by considering several straight-forward hypotheses which, devoid of historical context, might explain the divergence in such laws. I then employ historical evidence to dismiss the hypotheses that are inconsistent with the historical record. In particular, I overview a series of historical facts related to two of the most ubiquitous economically inhibitive laws in Islam and Christianity – interest (usury)[3] bans and printing restrictions. These laws are conducive to shedding light on the general forces at work, as laws forbidding interest and the replication of words and images were equilibrium outcomes under certain economic conditions (before the commercial revolution and the advent of the printing press), yet they persisted in spite of changing circumstances under which they were inhibitive to economic development.[4]

[3] Though the terms interest and usury have different meanings in their modern context, in pre-modern times they were largely synonymous, and will thus be used interchangeably throughout the paper (Divine 1959; Persky 2007).

[4] For a study of the emergence of interest bans as an equilibrium outcome in economies where borrowing is primarily for consumption, see Rubin (2008). Several other economic models have recently been advanced to explain interest bans. A common theme in many of these models is that interest bans are socially optimal given the conditions of the pre-modern economy (Posner 1980; Brenner 1983; Glaeser and Scheinkman 1998). However, these models have difficulty accounting for some of the historical phenomena analyzed in this paper, such as the

I find only one hypothesis that cannot be dismissed. This is, namely, that the differential persistence of economically inhibitive laws is a consequence of the greater degree to which Islamic political authorities are dependent on conforming to the dictates of religious authorities for legitimacy.[5] This institutional difference is an *exogenous* remnant of the circumstances surrounding each religion's birth. Its unintended consequences on equilibrium actions and outcomes are thus amenable to a theoretical analysis which falls into a broader literature seeking exogenous roots of institutional and economic differences (Diamond 1997; Kuran 2001, 2003, 2005; Acemoglu, Johnson, and Robinson 2001, 2005; Engerman and Sokoloff 2002).

In order to shed light on the consequences of this institutional difference, I construct a theoretical model containing two salient features: 1) the existence of a productive action which is initially banned by political and religious authorities, and 2) political authorities are dependent on religious authorities for legitimacy. The model analyzes how the interactions between political authorities, religious authorities, and the laity affect the sustainability of economically inhibitive religious laws under varying degrees of institutional dependence. The basic tension examined is the one between the political and religious authorities' relationship with the laity, whose productivity they have incentive to maximize, and their sources of legitimacy. The political authority derives legitimacy by conforming to the dictates of the religious authority, while the religious authority derives legitimacy by upholding its "eternal" doctrine.

I show that when the political authority's dependence on conforming to the dictates of the religious authority for legitimacy is sufficiently large, institutions which support economically

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divergence in interest theory in Islam and Christianity and the persistence of interest restrictions despite the feasibility of investment lending.

[5] This paper recognizes that the term "religious authority" is at best an abstraction in the Islamic world. However, the intuition of the argument holds as long as the behavioral assumptions employed in this paper are similar to those driving the actions of a decentralized authority.

inhibitive laws are more likely to be self-enforcing. The logic underlying this result is as follows. When dependence is large, it is costly for political authorities to permit religiously-prohibited actions, so they are unlikely to do so. In turn, only a small portion of the laity transgresses the prohibition, since this entails worldly costs (jail, contract non-enforcement) *and* other-worldly costs (going to hell). With few individuals breaking its dictates, the religious authority has little incentive to enact a costly reinterpretation. Thus, the players' interactions entail that no player has incentive to "push the envelope", and the institutions upholding the law are self-enforcing. However, when the level of dependence is small, the institutional structure supports such incentives, and the institutions undermine the related laws. This encourages *endogenous* institutional change – the outcomes emanating from players' actions entail that the set of institutions constraining their behavior changes over time.[6]

I substantiate the model's claims by re-analyzing the histories of interest bans and printing restrictions in the context of the model. I show that the interactions predicted by the model under differing institutional circumstances are salient features of these histories, and they can account for a wide variety of disparate (and sometimes unexpected) historical phenomena.

The paper is organized as follows. Section II presents stylized facts of printing and interest histories, employing these facts to dismiss hypotheses which are not consistent with the historical record. Section III sheds light on the one hypothesis not dismissed – the divergence in economically inhibitive laws stems from the greater degree to which political authorities depend on religious authorities for legitimacy in Islam – formulating a model which highlights the economic consequences of this difference. Section IV revisits the histories of interest and

[6] For more on the theory of endogenous institutional change, see North (1990, ch. 9-11), Greif and Laitin (2004), and Greif (2006, ch. 5-6).

printing restrictions in the context of the model. Section V considers the broader ramifications of the discussion, and Section VI concludes.

II. Stylized Facts and Potential Hypotheses

II.1. Stylized Facts – Interest and Printing Restrictions in Islam and Christianity

This paper employs a methodology championed by Greif (1993, 2006), utilizing a theoretical model aimed at facilitating an understanding of an economic relationship in a specific historical setting. As in Greif, the approach taken here is that the model should be based as much as possible on assumptions justified by historical evidence, and in turn, the model should account for phenomena under consideration while employing the fewest possible additional assumptions.

To this end, this section summarizes nine stylized facts (SF) of interest restrictions and seven stylized facts of printing restrictions in Islam and Christianity.[7] These facts are employed to test the scope of a variety of potential hypotheses related to the differential persistence of economically inhibitive religious laws. The history thereby tames the theory, pointing our focus away from hypotheses not consistent with the historical evidence.

SF #1: Christian interest restrictions were strengthened in the twelfth century (most famously through Lateran II and III) (Le Goff 1979).

SF #2: The Church commenced a series of relaxations of the ban beginning in 1270. In subsequent centuries, Church leaders allowed other open, circumventive practices that were similar in spirit to lending at interest, and by the nineteenth century taking moderate interest was permitted (Noonan 1957, 1969; Divine 1959).

[7] For a more detailed account on interest history, see Noonan (1957), Divine (1959), Homer and Sylla (1990), and Rubin (2007). For printing history, see Febvre and Martin (1958), Eisenstein (1979), and Robinson (1993).

SF #3: Secular interest caps – which effectively legalized moderate interest – became ubiquitous throughout Europe in the middle of the thirteenth century (Rubin 2007).

SF #4: Many of the later Christian relaxations of the interest ban came from outside the papacy, being espoused by disparate theologians at the Universities. Papal bulls were decreed in opposition to many of the transactions permitted by the theologians (Noonan 1957, 1966).

SF #5: Christian usurers were considered amongst the worst types of evil-doers in the medieval period, often compared with murderers and rapists, and were subject to legal and ecclesiastical prosecution (Le Goff 1979, 1988; Helmholz 1986). On the other hand, there is little evidence that Muslim usurers faced temporal penalties beyond not having their contracts enforced (Gerber 1999).

SF #6: Muslim lenders employed ruses (*hiyal*) in order to circumvent the ban as early as the first Islamic century. *Hiyal* were allowed (and created) by religious authorities, but merchants rarely conducted (and political authorities rarely allowed) interest-bearing transactions beyond those allowed by the religious authorities (Khan 1929; Schacht 1964, 2006; Coulson 1969; Grice-Hutchinson 1978).

SF #7: Interest was de facto legalized in much of the Ottoman Empire in the mid-fifteenth century; most interest-based transactions were permitted as long as sufficient lip service was paid to Islamic law (*sharī'a*) (Gerber 1988, ch. 7; Imber 1997). The interest ban remains part of Islamic doctrine today.

SF #8: Muslim religious authorities allowed one major reinterpretation of interest theory – the permission of *hiyal*. Christian religious authorities frequently reinterpreted on the margin, allowing only specific practices to be conducted without sin.

SF #9: The Christian interpretation of interest was less permissive than the Muslim one for much of their shared history. Early Islamic *hiyal* were closer to open lending at interest than any type of transaction allowed by the Church until the fifteenth century.

SF #10: The printing press spread rapidly throughout a cross-section of important Western European cities and the Church was amongst its greatest supporters (Febvre and Martin 1958).

SF #11: In the late-thirteenth century, the Church lost its monopoly on educational and intellectual (especially book-producing) institutions, which it had previously held via the book-producing efforts of the monasteries, when the Universities began to undertake major book-publishing programmes of religious and secular tracts (Haskins 1957; Schachner 1962; Christ 1984).

SF #12: The secular wings of the Universities were able to grow in the late-thirteenth century largely because they received the support of lay rulers (Schachner 1962).

SF #13: Although the printing press was known in the Ottoman Empire as early as 1493, there were no Muslim presses in the Ottoman Empire until 1727, and outside the Ottoman Empire the press spread even slower (Göçek 1987; Savage-Smith 2003).

SF #14: Muslim religious authorities claimed that the press diminished the importance of the oral transmission of the Qur'an (Robinson 1993). This system of transmission was the backbone of Muslim education, but it also entailed that the mass production of books threatened the religious authority's control of the educational and legal systems (Göçek 1987; Savage-Smith 2003).

SF #15: Until the eighteenth century, Ottoman *sultān*s explicitly forbade Muslims from printing in Arabic script, though non-Muslim printing presses were permitted (Göçek 1987; Savage-Smith 2003).

SF #16: It was not until the nineteenth century that the press became widespread in the Muslim world. The press flourished with greater rapidity in regions where Muslims were under some form of colonial rule and the threat of the West to Islam was more apparent, and it was delayed longer – although eventually accepted – in regions that were threatened by Europe, but were not under direct Western control (Robinson 1993).

II.2. Potential Hypotheses

In this section, I consider seven hypotheses – representing the most prominent differences in culture and institutional structures in the Muslim and Christian worlds – which could explain the differential persistence of economically inhibitive laws in Islam and Christianity. Devoid of historical context, any of these hypotheses could theoretically account for the differences. However, a convincing hypothesis should be able to account for the sixteen stylized facts presented in the previous section. While I am not claiming a mono-causal explanation exists for such a complex phenomenon, it may be possible to tease out which one of the many possible explanations best suits the historical evidence. All of the seven potential hypotheses (PH) suggested in this section likely played some role in the divergence, but only one – the divergence stems from the greater degree to which Islamic political authorities derive legitimacy from religious authorities (PH #7) – is consistent with all sixteen stylized facts.

PH #1: Social pressures provided incentive for individuals to falsify their preferences, which allowed economically inhibitive equilibria to persist (as in Kuran 1995, 1997).

This hypothesis cannot explain why preference falsification occurs in the Muslim economic setting but not the Christian one. Thus, while social pressures exacerbate the effects of most of the potential hypotheses, they cannot be the ultimate cause.

PH #2: The divergence is cultural in nature – Christian "individualism" versus Islamic "collectivism" promoted different equilibrium outcomes (as in Greif 1994).

One testable prediction arising from this argument is that law-breakers should receive less social condemnation in individualistic (Christian) societies. Yet, medieval Christian usurers received harsher social penalties (being stigmatized in the same vein as murderers and rapists) than Muslim usurers (SF #5).

PH #3: The divergence stems from the hierarchical nature of the religious institutions in pre-Reformation Christianity relative to those of Sunni Islam.[8]

A testable prediction arising from this hypothesis is that the relaxation of inhibitive laws results directly from the centrality of authority. Thus, this hypothesis cannot account for the later relaxations of the Christian interest ban coming from *outside* the papacy, being espoused by disparate theologians at the Universities (SF #4). Indeed, papal bulls were decreed in *opposition* to many of the transactions permitted by the theologians.

PH #4: The religious homogeneity of pre-Reformation Europe relative to Islam, which is not only divided into Shī'i and Sunni, but the latter into four major schools of jurisprudence, played a defining role in the divergence.[9]

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[8] Within Islam, it is commonly held that Shī'i Islam has a more hierarchical structure than Sunni Islam. Yet, these structures contain an incredible amount of heterogeneity over time, and the Shī'i hierarchy only began to emerge when the Safavid rulers made Shī'i the state religion of Iran in the early sixteenth century (Arjomand 1985, 1988). Hierarchical structures are not completely absent in Sunni Islam, where a highly developed sense of rank amongst *muftī*s has had considerable influence on the validity of various *fatwā*s (Stewart 1988).

[9] Culture is another source of heterogeneity in the Muslim world. Islam has a substantial number of followers in North Africa, the Arab world, Turkey, the Indian subcontinent, and the Malay peninsula.

Religious homogeneity in Europe was not greatly threatened until the Reformation, and thus this hypothesis cannot explain the dramatic pre-Reformation changes in Christian interest theory (SF #2). Moreover, given the implications of this argument, it cannot explain why Muslim authorities were *more* permissive that Christian ones until the fifteenth century (SF #9).

PH #5: The divergence emanated from the lower cost of coordination between Muslim political and religious authorities.

Indeed, Christian interest restrictions were weakened after coordination became less costly in the thirteenth century (SF #2), and Ottoman interest restrictions were relaxed soon after the position of jurisconsultant (*muftī*) became an apparatus of the state (SF #7). Yet, these facts contradict the broader historical reality that coordination was *less* costly in the Muslim world. Most judges (*kādī*) – who were the primary enforcers of the law – were appointed by political leaders, who were able to extract favors in return for job security and power (Imber 1997). This entailed coordinative ability which was never present, at least to such an extent, in Europe after the (twelfth-century) Investiture Controversy. Thus, a theory based on coordinative ability cannot account for the ban's dissipation in Christianity but not Islam while also accounting for SF #2 and SF #7.

PH #6: Monetary incentives drove religious authority's actions and hence the divergence (as in Ekelund, Hébert, and Tollison 1989).

Although there were clear economic incentives for Muslim religious authorities to suppress the spread of printing (SF #14), this hypothesis cannot explain the Ottoman *sultān*s forbidding Muslim presses for centuries (SF #15). The *sultān*s permitted non-Muslim printing presses, indicating that it was in their interest to do so. Yet, they forbade Muslims from printing in Arabic script for centuries – such complicity cannot be accounted for via the religious authority's

monetary incentives. Moreover, Christian interest theory was heavily influenced after the fifteenth century by those outside of the papacy (SF #4), suggesting that (unlike the argument presented in Ekelund, Hébert, and Tollison [1989]) changes in interest theory were not a direct result of economic motivations of the Church and especially the pope.

PH #7: The divergence stems from the greater degree to which Islamic political authorities derive their legitimacy from the dictates of religious authorities.

This is the only one of the potential hypotheses which is not contradicted by one of the stylized facts of interest and printing histories. Moreover, this differing institutional relationship stems from the birth of these religions and is thus *exogenous* to the specific doctrines in question, making it conducive to theoretical analysis. Early Christians were forced to live under Roman authority, where it was both unnecessary and infeasible to create a legal system based on religious principles, and early Church leaders advocated a separation between political and religious institutions.[10] On the other hand, Islam was formed at a time of weak centralized power and tribal feuding in the Middle East. Consequently, Islamic ideals quickly became those of the state, and there has never been a clear demarcation in the Muslim world between religious and legal authority.[11]

But can this hypothesis account for *all* of these facts? Although the hypothesis is not contradicted by any of the facts, it does not obviously *account* for some of them, such as SF # 5, 8, 9, 10, 15, and 16. In order to explore this possibility, I build a theoretical model which captures the salient institutional elements of both religions and analyzes how changes in these

[10] The most famous support for this position is attributed to Jesus: "Render unto Caesar the things which are Caesar's, and unto God the things that are God's" (Matthew 22:21).

[11] For more on the exogeneity of this difference in institutional structures, see Lewis (1974, 1995) and Rubin (2007). For more on the intersection of the religious and the legal in Islam, see Lewis (1974, 1995, 2002) and Hassan (1981).

elements – particularly the level of "institutional dependence" – affect the equilibrium interactions between the relevant players and the sustainability of economically inhibitive religious laws.

III. Model: Institutional Dependence and Persistent Equilibria

III.1. Overview of the Results

This section considers an economy consisting of three types of players – a political authority (PA), a religious authority (RA), and numerous laity (L) – and containing two salient features: 1) the existence of a productive action which is initially banned by the PA and RA, and 2) the PA derives legitimacy from conforming to the dictates of the RA. I model the interactions of the players in order to shed light on the relationship between these two features under a basic set of historically-motivated behavioral assumptions.

The model highlights the consequences of an exogenous "period 0" event that increases the productivity of all L's (for example, the emergence of capitalistic markets allowing for investment lending or the invention of the printing press allowing for mass printing). This event sparks interactions between the players, who are infinitely-lived and whose actions and objectives are described below.

Laity. L's act first, deriving utility from producing via some action which is an input in a production function. They can choose to abstain from acting, act openly, or choose from a menu of actions which incur a transaction cost (such as a black market or a ruse which violates the spirit, but not the letter, of the law). They incur costs for breaking the dictates of the PA and RA.

The former cost is the one incurred from going to jail (if detected) or, if the action involves a contract, from lack of legal enforcement. The latter cost is a "spiritual" one, such as fear of hell.[12] *Political and Religious Authorities*. After L's act, the PA and RA, acting simultaneously, choose to either ban the action (which they do in period 0), allow it openly, or allow it as long as a sufficiently large transaction cost is undertaken. The PA and RA derive utility from L's production.[13] They do not know L's utility functions, so they employ L's past actions as a (unmodeled) signal for L's future response to interpretations. Hence, I simplify the analysis by assuming that the PA and RA derive greater utility from relaxing their interpretation when L's act more openly. That is, if L's act openly despite incurring legal or spiritual costs, the RA and PA view this as a positive signal of the action's productive consequences. This specification also allows simplification to a repeated one-period game – although the RA and PA are forward-looking in nature, they do not know the future effects of their interpretations with certainty and thus recalculate their optimal interpretation in each period.[14]

The degree to which the PA and RA derive utility from L's production is dependent on the legitimacy of their interpretations. The former derives legitimacy by according with the dictates of the latter, a phenomenon which is at the heart of this model. For reasons noted in Section II (PH #7), I assume that the degree to which the PA depends on the RA for legitimacy – modeled as a "dependence parameter" – is exogenous. The PA's cost of diverging from the RA's

[12] Otherworldly sanctions are widely seen as an important force in sustaining economic equilibria. See, for example, Azzi and Ehrenberg (1975), Richardson (2005), and Rubin (2008).

[13] Lay production can benefit the PA or RA in numerous (unmodeled) ways. It benefits them if they are benevolent, and even if they are self-interested, production provides a greater tax base and decreases the cost of social insurance provision. For examples of these motivations in history, see Duby (1980) and Ekelund et al. (1996).

[14] This specification can also account for situations in which the RA has economic incentive to suppress the action. In this case, the more open L's past actions are, the greater the returns to permitting the action are *relative* to the costs, since L's actions diminish the utility the RA receives by suppressing the action. For example, Muslim jurists had incentive to suppress printing in order to maintain their monopoly on educational and intellectual institutions. Yet, as the press spread, their monopolies were lost, in turn decreasing the relative cost of permitting printing.

interpretation is increasing in the dependence parameter, and the model analyzes how changes in this parameter affect equilibrium outcomes.

On the other hand, the RA derives legitimacy from two sources (both of which are noted repeatedly in the historical literature). One source is its hold on "eternal truths" – when such truths are reinterpreted the very nature of its authority is threatened (Noonan 1993, 2005; Ekelund et al. 1996; Hallaq 2001). The other source of legitimacy is the degree to which its dictates are followed by L's. Indeed, accommodating custom has historically been an open concern of Islamic and Christian religious authorities (Schacht 1964, p. 78-85; Noonan 1966, 1993, 2005; Rodinson 1973; Imber 1997; Libson 1997; Gerber 1999; Hallaq 2001; Zubaida 2003, ch. 1-3).

Results. The model sheds light on the avenues through which institutional dependence supports economically inhibitive religious laws. Its primary result is that the size of the parameter set over which an economically inhibitive religious law persists is increasing in the degree to which the political authority depends on the interpretation of the religious authority for legitimacy.

The logic underlying this result is as follows. The first order effect of an increase in dependence is that the PA's interpretation is less permissive. In turn, lay agents are discouraged from transgressing the law, as they face both spiritual and legal costs from doing so. With few agents openly breaking its dictates, the RA has little incentive to reinterpret, since doing so is costly and there is little to be gained on the margin. No player has incentive to change actions and the institutions upholding the laws are *self-enforcing*. However, when the level of dependence is small, the PA has greater incentive to legalize the action. In turn, more agents transgress the RA's law, as they only face spiritual (and not legal) costs from doing so. With more agents breaking its dictates, the RA has greater incentive to reinterpret its doctrine. The

implications of the institutional structure thus *undermine* the related laws, encouraging endogenous institutional change.

III.2. Setup

Consider an economy in which all players are infinitely lived and actions are common knowledge. These players engage in a dynamic game with perfect information of previous actions. There are $N + 2$ players (for some large N): N members of the laity (L), a religious authority (RA), and a political authority (PA). N is large enough such that the actions of any one L do not affect the equilibrium action of the RA or PA (that is, no agent is pivotal).[15] There are two salient features of this economy: 1) the existence of some action which is an input in a production function $g(\cdot)$, where L's derive utility from producing and the RA and PA interpret the spiritual and secular "legality" of the action, respectively; 2) the PA derives legitimacy from conforming to the dictates of the RA – the degree to which the PA derives legitimacy, γ, is exogenous and enters the model in a manner described at the end of this subsection.

In each period (denoted with subscript t), L's act first, and choose an action $a_t \in A$, where $A = \{0, a^1, a^2, \ldots, a^m, 1\}$, $0 < a^1 < a^2 < \ldots < a^m < 1$. A is interpreted as follows: $a_t = 1 \Rightarrow$ openly acting; $a_t = 0 \Rightarrow$ not acting; $a_t \in \{a^1, a^2, \ldots, a^m\} \Rightarrow$ acting, but incurring transaction cost $tc = 1 - a^j$ (for $j \in \{1, \ldots, m\}$). All L's have different types, τ_i, distributed over a cdf $F(\cdot)$, where L's marginal product is increasing in type.

After L's act, the PA and the RA simultaneously choose an interpretation, $i_t^{PA} \in A$ and $i_t^{RA} \in A$, respectively. L's face a legal cost $\ell(\cdot)$ when its actions are greater than the PA's interpretation ($a_t > i_{t-1}^{PA}$). This function has the properties $\ell' > 0$, $\ell'' > 0$, and $\ell(x) = 0$ if $x \leq 0$.

[15] Alternatively, the actions of the RA and PA could be modeled as "quasi-parameters", as in Greif and Laitin (2004) and Greif (2006). That is, their actions are exogenous to the laity at any point in time but are endogenous to the game as a whole.

L's also face a spiritual cost $s(\cdot)$ for actions greater than the RA's interpretation.[16] The spiritual cost is increasing in the degree of deviation from the religious law.[17] This function has the properties $s' > 0$, $s'' > 0$, and $s(x) = 0$ if $x \leq 0$.

Each L (denoted with subscript i) solves the following problem in each period t:[18]

$$\max_{a_{t,i}} g(a_{t,i}; \tau_i) - \ell(a_{t,i} - i_{t-1}^{PA}) - s(a_{t,i} - i_{t-1}^{RA}), \tag{1}$$

where $g_1 > 0$, $g_{11} < 0$, $g_{12} > 0$, and $g(0;\cdot) = 0$.

The primary parameter of concern in the model, $\gamma \in [0,1]$, denotes the degree to which the PA derives legitimacy/utility by conforming to the interpretation of the RA. This parameter enters the PA's utility through its reinterpretation cost function, $c^{PA}(\cdot;\gamma)$. There is no inherent cost to reinterpretation for the PA, but differing from the RA is costly if $\gamma > 0$. This function has the properties $c_1^{PA} \geq 0$, $c_2^{PA} > 0$, $c_{11}^{PA} > 0$, $c_{12}^{PA} > 0$, $c^{PA}(x;\cdot) = 0$ if $x \leq 0$, $c^{PA}(y;0) = 0 \; \forall \, y$, and $\left\{c^{PA}(z;1) = \begin{matrix} 0 \text{ if } z \leq 0 \\ \infty \text{ if } z > 0 \end{matrix}\right\}$. That is, at $\gamma = 0$, there is no reinterpretation cost, at $\gamma = 1$, there is infinite reinterpretation cost, and at $\gamma \in (0,1)$, there is a positive reinterpretation cost which is increasing in γ. The PA derives utility from L's production, and it derives more utility from a greater interpretation the greater L's actions are. The PA solves the following problem in each period t:

$$\max_{i_t^{PA}} K^{PA}(i_t^{PA}, \bar{a}_t) - c^{PA}(i_t^{PA} - i_{t-1}^{RA}; \gamma), \tag{2}$$

[16] These two types of costs are similar to those modeled in Kandel and Lazear (1992), who look at internal and external motivations in the context of peer pressure and partnerships.

[17] Similar assumptions are employed in Iannaccone (1988) and Kuran (1995).

[18] Although L's are infinitely lived, their utility is not maximized over an infinite horizon. Their individual actions do not affect the PA, RA, or other laity, so a discount factor would merely act as a scalar. I am not concerned with changes in equilibria across different discount factors, so this consideration has been omitted.

where $\bar{a}_t$ is the vector of L's actions and $K^{PA}: \Re^{N+1} \to \Re$ has the properties $K_1^{PA} > 0, K_{11}^{PA} \to 0, K_{1j}^{PA} > 0 \; \forall \, j \in \{2, \ldots, N+1\}$.

The RA faces a reinterpretation cost, $c^{RA}(\cdot)$, which is increasing in the distance between the new and old interpretations (that is, the degree to which "eternal" truths are reinterpreted). This function has the properties $c^{RA\prime} > 0$, $c^{RA\prime\prime} > 0$, and $c^{RA}(x) = 0$ if $x \leq 0$. The RA derives utility from L's production, and it derives more utility from a greater interpretation the greater L's actions are. The RA also derives utility from L's following its dictates ($a_t \leq i_t^{RA}$). It solves the following problem in each period t:

$$\max_{i_t^{RA}} K^{RA}(i_t^{RA}, d, \bar{a}_t) - c^{RA}(i_t^{RA} - i_{t-1}^{RA}), \tag{3}$$

where $d = \sum_{k=1}^{N} 1\left(a_{t,k} \leq i_t^{RA}\right)$, $1(x)$ is an indicator function equaling one if x is true, and $K^{RA}: \Re^{N+2} \to \Re$ has the properties $K_1^{RA} > 0, K_{11}^{RA} \to 0, K_2^{RA} > 0, K_{1j}^{RA} > 0, K_{2j}^{RA} > 0 \; \forall \, j \in \{3, \ldots, N+2\}$.[19] The RA and PA break indifference by not reinterpreting. The initial conditions are $\bar{a}_0 = i_0^{RA} = i_0^{PA} = 0$, and all functions are assumed to be smooth.

III.3. Institutional Dependence and Persistent Equilibria

In this section I study players' behavior in order to derive a link between the level of institutional dependence (γ) and the RA's and PA's interpretation in equilibrium. The following definitions simplify the analysis:

DEFINITION 1. The institutional structure is **self-enforcing** in period t if $a_{t,k} = a_{t-1,k} \; \forall \, k$, $i_t^{RA} = i_{t-1}^{RA}$, and $i_t^{PA} = i_{t-1}^{PA}$.

[19] The assumptions $K_{11}^{PA} \to 0$ and $K_{11}^{RA} \to 0$ allow for clean results. Dropping them does not dramatically alter the qualitative results, but merely allows for the existence of special (and uninteresting) cases. They are actually much stronger assumptions than are necessary for the results to hold – as long as K_{11}^{PA} and K_{11}^{RA} are not *too* concave, all of the propositions hold.

DEFINITION 2. An equilibrium is **persistent** in period t if the institutional structure is self-enforcing in every period $\bar{t} \geq t$.

DEFINITION 3. A persistent equilibrium in which either $i^{PA} < 1$ or $i^{RA} < 1$ is **inhibitive**.

First, note that there exists a persistent equilibrium in *every* parameter set. To see this, assume that this is not true – that is, there is a parameter set in which a persistent equilibrium does not exist. Then, in every period, either $a_{t,k} > a_{t-1,k}$ for some k, $i_t^{RA} > i_{t-1}^{RA}$, or $i_t^{PA} > i_{t-1}^{PA}$. Since A is finite and players are infinitely lived, these three inequalities cannot hold *ad infinitum*.

The persistent equilibrium is also unique. Uniqueness arises from the simplicity of the model – there is no randomness nor exogenous change, an explicit rule exists for breaking indifference, and persistent equilibria are a steady state.

Next, consider the relationship between γ and the existence of inhibitive equilibria. Since multiple equilibrium paths exist over the parameter space (largely driven by the shape of $F(\cdot)$) shedding light on salient outcomes may be impossible without confining attention to a specific subset of cases. Hence, for the remainder of the analysis I follow a methodology advocated by Greif (1993, 2006) and Bates et al. (1998), in which historically relevant facts guide concentration to the appropriate equilibria.

In this light, I follow Noonan (1966, 1993, 2005), Rodinson (1973), Libson (1997), and Hallaq (2001), who show that Muslim and Christian authorities historically have "accepted" practices which have become custom. In the present model, such acceptance occurs endogenously under some parameter specifications. For the remainder of the analysis, I confine attention to these parameter sets. The following definition is useful for this analysis.

DEFINITION 4. The interpretations in the unique persistent equilibrium are **accepted religiously** in period t^* if and only if $i_{t^*}^{RA} = i_{t^*}^{PA}$.

Accepted religiously persistent equilibria (ARPE) have the property that religious interpretation is never lagging in the long run – that is, custom is "accepted". Although concentrating on such equilibria diminishes some of the model's traction, history points to equilibria in which religious interpretation is malleable to economic exigencies.

Concentrating on ARPE permits a more straight-forward analysis of the consequences of institutional dependence. The first-order effect of dependence is an inherent inflexibility arising from the PA's reinterpretation cost function. Because of this inflexibility, high-dependence PA's differ less in their interpretation from the RA, *ceteris paribus*, and the incentive for the laity to "push the envelope" and break the religious and/or legal dictates are diminished. This in turn provides less incentive for the PA and RA to reinterpret. If the level of institutional dependence is sufficiently large, a situation emerges in which no player has incentive to "push the envelope", and the resulting inhibitive equilibrium is supported by self-enforcing institutions. Proposition 1 formalizes this intuition, providing the primary comparative static result of this paper. Proofs of all propositions are in Appendix A.

PROPOSITION 1. In the unique ARPE, the equilibrium actions i^{RA*} and i^{PA*} are weakly decreasing in γ.

Proposition 1 highlights the effect of dependence in persistent equilibria. Yet it provides no insight into periods before such equilibria are reached. The remaining analysis sheds light on these periods, in turn increasing the number of testable predictions arising from the model.

To this end, I conduct a qualitative analysis of i^{PA*} and i^{RA*} (for one parameter set with a large enough number of ruses (m) that the interpretations are close to smooth) over the first three periods, highlighting some of the consequences of institutional dependence. I discuss the

intuition underlying the interpretations in each period and relate these interpretations to more general outcomes. For illustrative purposes, I omit the interpretations of the laity.

Period 1: All RA's face the same optimization problem regardless of γ, and thus all choose the same interpretation. The only difference for the PA's is γ. It thus follows from the PA's maximization problem that i_1^{PA} is weakly decreasing in γ. For sufficiently large γ it is too costly for the PA to differ from i_0^{RA}, so $i_1^{PA} = 0$.

[INSERT FIGURE I HERE]

Period 2: All L's actions are weakly greater than in period 1. L's actions are increasing in i_1^{PA}, so i_2^{PA} is decreasing in γ. All PA's choose $i_2^{PA} \geq i_1^{RA}$, since there is no cost associated with interpretations less than i_1^{RA}.

Low-γ PA's choose a greater i_1^{PA} in period 1, entailing that L's choose greater actions in period 2. In this case, L's actions are large enough that the RA's marginal reinterpretation cost outweighs the marginal benefit of permitting such actions. Yet, at a sufficiently large γ (or sufficiently small i_1^{PA}), L's actions are not great enough to discourage the RA from choosing $i_2^{RA} \geq i_1^{PA}$, thus accommodating custom and increasing the number of L's following its dictates (d). This entails a "kink" in the graph; at some large γ, the RA's return from accommodating a larger portion of L's actions (who barely transgress i_1^{PA} in order to incur a small legal cost) is sufficient to encourage such an interpretation, though it is not for lower-γ RA's. That is, L's evade the low-γ RA's dictates to a greater extent, and thus interpreting to "accommodate custom" ($i_t^{RA} \geq a_{t,i}$) entails a larger reinterpretation cost.

[INSERT FIGURE II HERE]

This intuition is generalizable and entails two testable predictions. The first is that a high-dependence RA should reinterpret less frequently than a low-dependence RA before "catching up with custom". This intuitive result is formalized in Proposition 2.

PROPOSITION 2. For all equilibria in which interpretations are accepted religiously when $i_t^{RA} < 1$, the number of reinterpretations by the RA before $i_{t^*}^{RA*} \geq i_{t^*-1}^{PA*}$ in some period t^* is weakly decreasing in γ, *ceteris paribus*.

The other result stems from the fact that under some parameter sets, it is possible that L's actions encourage the high-dependence RA to interpret at least to i^{PA} while the low-dependence RA is taking smaller steps in order to catch up with custom. This intuition entails the unexpected, testable prediction (which is formalized in Proposition 3) that a greater level of dependence can temporarily lead to a *more permissive* religious interpretation – that is, a functioning black market or institutionalized set of ruses may arise more quickly in a high-dependence economy.

PROPOSITION 3. Consider two economies, A and B, with dependence parameters γ_A and γ_B, respectively, where $\gamma_A > \gamma_B$ and all other parameters are equal. In an ARPE, ∃ some parameter sets in which $i_{t^\circ}^{RA*}$ in economy A is greater than $i_{t^\circ}^{RA*}$ in economy B in some period t° prior to the one in which both interpretations are accepted religiously.

Period 3: This period contains phenomena similar to those in Period 2, but over a larger part of the parameter set. L's actions are increasing in i_2^{RA} and i_2^{PA}, which in turn entails greater i_3^{RA} and i_3^{PA}. It is clear that Propositions 2 and 3 hold over varying values of γ. Even more kinks arise, and there are values of γ for which a higher-dependence RA has a greater interpretation than a lower-dependence RA (Proposition 3), and the number of interpretations before $i_3^{RA} \geq i_2^{PA}$ is weakly decreasing in γ (Proposition 2).

[INSERT FIGURE III HERE]

*Period t**: This period represents an ARPE. A portion of the interpretations are inhibitive, and the interpretations are weakly decreasing in γ, even at γ in which a "kink" arose in previous periods (Proposition 1). For such γ, once the interpretations are accepted religiously there is greater incentive for all players to "push the envelope", and interpretations in these economies are relaxed to a greater extent.

[INSERT FIGURE IV HERE]

With these results, the theoretical exercise is complete. By focusing on ARPE, we have derived the following testable predictions:

- It is more likely that an ARPE is inhibitive the greater the level of institutional dependence (Proposition 1).
- The number of religious reinterpretations that occur before the RA "catches up with custom" is decreasing in institutional dependence (Proposition 2).
- An economy with greater institutional dependence may temporarily be *more* permissive then the one with less dependence, though this equilibrium will not persist (Proposition 3).

IV. Stylized Facts in the Context of the Model

I now reconsider the stylized facts presented in Section II in the context of the salient interactions predicted by the model.

In the eleventh through thirteenth centuries, as capitalistic markets materialized in Western Europe (a "period zero" event), papal power also reached its zenith, with the popes establishing suzerainty over secular lands (that is, γ was relatively large). Proposition 1 predicts that interest restrictions should be strengthened in this period (SF #1). By the late thirteenth

century, ecclesiastical leaders had lost much of their authority and secular regents were able to recapture domain over their lands (Feldman 1997).[20] As the Proposition 1, it is precisely in this period that interest restrictions were relaxed (SF #2). Indeed, the interactions analyzed in the model were salient – as the political authorities began to depend less on the Church for legitimacy, they started to allow moderate interest (SF #3). Meanwhile, the Church slowly caught up with custom, its dictates coming from disparate theologians who faced the smallest cost of reinterpreting doctrine (SF #4). This history thus accords with the model's intuition – as institutional dependence diminished in medieval Europe, incentives emerged for lenders to "push the envelope", and the institutions that had been supporting the ban were undermined.

In the Islamic world, *muftī*s (the primary source of legal and religious reinterpretation in Islam) and other religious scholars gained considerable independence from the state by the end of the first Islamic century (Masud, Messick, and Powers 1996; Berkey 2003; Hallaq 2005). In the face of a powerful legal class, the caliphate had little choice but to comply with Islamic law – otherwise, the philosophy underpinning their legitimacy, which was largely based on their blood lines connecting them to the Prophet, would have been undermined (that is, γ was very large). Since permitting ruses (*hiyal*), which were arguably within the confines of the law, was relatively inexpensive – the "envelope" was not pushed too far – Muslim religious (and political) authorities generally allowed them (SF #6). Moreover, because merchants were lending at small cost while facing significant sanctions for transgressing the ban, they had little incentive to further "push the envelope", while an absence of lay "push" provided no incentive for political or religious authorities to reinterpret. This inhibitive equilibrium persisted until the early Ottoman

[20] The changing tide in church-state relations in this period was a result of phenomena exogenous to the argument – contributing factors include the growth of secular power into national kingdoms, new theories of the state based on Aristotelian foundations, and movements of criticisms within the Church (Tierney 1988).

period, when the religious authorities became a part of the state – a change which enabled a "limited but significant expansion in the ruler's prerogatives in relation to the *sharī'a*" (Berkey 2003, p. 264).[21] Concurrently, as Proposition 1 predicts, interest restrictions were relaxed, though lip service was paid to the *sharī'a* (SF #7) – that is, a less inhibitive equilibrium emerged (which pervades much of the Muslim world in the present day).[22]

Moreover, the model clarifies some other aspects of interest history. In particular, while an "inhibitive equilibrium" emerged early in Islamic history after the permission of *hiyal*, European political authorities were more permissive of open interest-bearing transactions by the mid-thirteenth century. In response, Christian religious authorities frequently reinterpreted on the margin, allowing only *specific* practices to be conducted without sin. This entailed a situation, predicted by Propositions 2 and 3, in which Muslim authorities permitted relatively costless (yet inhibitive) exceptions to the law via *hiyal*, while Christian authorities accommodated custom with a series of "small" reinterpretations instead of a more dramatic (and much more costly) reinterpretation of doctrine (SF #8). For this reason, the Church was less permissive than Muslim religious authorities for much of their shared history (SF #9), and thus Christian punishment for transgressing the ban was harsher (SF #5).

[21] The major changes in the relationship between Muslim political and legal/religious authorities in the Ottoman period resulted from demographic heterogeneity (which limited the coordinative ability of the masses) and lack of external threats (Coşgel, Ahmed, and Miceli 2007) – phenomena outside the scope of the model's arguments. Similar institutional arrangements still exist in many modern Islamic polities; state *muftī*s were appointed in the twentieth century in Egypt, Saudi Arabia, Lebanon, Malaysia, Yemen, and Indonesia, and twentieth century constitutions in Egypt, Syria, Kuwait, Morocco and Iran (to name a few) include provisions making the *sharī'a* the law of the land (Schacht 1964, p. 107-110; Masud, Messick, and Powers 1996).

[22] An important set of questions arising from interest ban history include: Did the ban have any practical effect? If not, does it matter that the ban persisted in Islam but not in Christianity? Rubin (2007) shows that while the micro-level consequences of the ban may have been minimal, especially with regards to personal loans, it entailed substantial macro-level, institutional consequences.

The model also sheds light on European printing history.[23] Although there were plenty of reasons why the Church would have wanted to control the spread of the press – most prominently, the success of the Reformation was dependent on the Reformers ability to circulate vast amounts of literature – as the press began to spread, the Church was amongst its greatest supporters (SF #10). If the Church stood to lose so much by permitting the press, why did it – unlike its Muslim counterparts – support the spread of the press? Proposition 1 predicts that as European rulers began to regain suzerainty over their lands in the mid-13th century, they would support the economically productive actions of the Universities, particularly the writing and copying of non-religious (especially political) tracts which were not encouraged when the Church dominated the Universities (SF #11, 12). Indeed, this shift to secular rule over the Universities coincided with the emergence of interest rate caps – the exogenous macro forces changing the dependence parameter undermined the equilibrium state in both cases. The rise of the Universities provided a setting in which, after the invention of the printing press, there was widespread demand for books yet no Church-held monopoly on supply, allowing the press to spread without opposition from the Church (SF #10).[24]

On the other hand, acceptance of printing was delayed for centuries in the Muslim world. The costs to the religious authorities of permitting the press were substantial – it entailed a significant reinterpretation of doctrine and it diminished their monopoly power over the

[23] Some of the model's formulae do not directly apply to printing history – most importantly, the relevant action set is "print" or "not print", with no intermediate action (that is, there is no black market or way of evading the ban).

[24] New theories on the state based on Aristotelian foundations were a crucial "exogenous" force behind the changing Church-State relations of the mid-thirteenth century. While it is possible that the rise of the Universities caused this change in "dependence" – it is indeed likely that causation runs both ways – it does not detract from two important points. The first is that the rise of the Universities, especially in their role as book producers, came about largely because there was a sphere outside and disassociated from the religious in which it gained financial and political support. Secondly, the rise of the Universities was merely the precursor to the episode in question – the rapid spread of the press. The rise of the Universities is not necessarily a phenomenon that can be explained by the model, yet their emergence had important unintended consequences as spelled out in this section.

educational and legal systems (SF #14). In response to disapproval from religious authorities, the political authorities – dependent on the RAs for legitimacy – forbade the press despite its early arrival in the Ottoman Empire and its potential as a source of revenue (SF #13, 15). The press' benefit to the state is evidenced by the fact that non-Muslim presses, which did not threaten the religious authority's monopoly, were permitted in this period (SF #15). It was only when printing became sufficiently profitable to the political authorities (largely in combating Western advances) that the costs of diverging from religious dictates were not sufficient to obstruct its permission (SF #16). In terms of the model, an inhibitive equilibrium emerged and persisted for centuries; the "escape" from this equilibrium occurred only after Western aggression caused a dramatic change in the parameter set.

V. The Big Picture: Was the "Gate of Ijtihād" Really Closed?

This paper tackles an important route through which religion has a direct impact on economic outcomes: the perpetuation of laws inhibiting economically productive actions. Its insights shed light on the general forces underlying the persistence of such outcomes *without* ascribing anything inherent to the religions themselves.

By refraining from attributing anything inherent in religion as the force underlying the economic divergence, this framework encourages a reconsideration of traditional notions of conservatism in the Islamic world. The most influential of these ideas is that the "gate of independent reasoning (*ijtihād*)" was closed in the tenth century (C.E.). Until recently, historians generally agreed that in this period some informal consensus arose that independent reasoning, an important method of reinterpretation in the first three Islamic centuries, was no longer an acceptable means of finding truth and that henceforth jurists were only allowed to follow

precedents (Schacht 1964, ch. 10; Coulson 1969; Weiss 1978; Rahman 1979; Watt 1988). Under this theory, juristic ingenuity was stifled in Sunni Islam after the founding of the four schools consolidated what had been widely dispersed judicial authority. Instead of exercising *ijtihād*, jurists were confined to accepting religious authority (*taqlīd*) (Hallaq 2001, ch. 4).

Some recent scholarship disputes this notion. Gerber (1999, ch. 4-7) cites numerous cases throughout the medieval period where *ijtihād* was employed. In a study of rulings (*fatwā*) by the seventeenth-century Palestinian muftī Khayr al-Dīn al-Ramlī, Gerber notes that numerous disagreements (*ikhtilāf*) which remained unresolved in the classical and post-classical periods arose in al-Ramlī's time, necessitating a relaxation of devotion to the ancient masters. Hallaq (1984, 2001) notes in great historical detail that the gate of *ijtihād* was never closed in theory nor in practice, though its practice became increasingly rare in the medieval period.

If the gate of *ijtihād* was not closed, independent reasoning *was* less frequently practiced after the tenth and eleventh centuries. Indeed, Gerber (1999, p. 138) admits that *ijtihād* was not freely permitted in every field, but only in those in which the law remained open. In this light, I propose an alternative metaphor: the "gate of *ijtihād*" may have been closed, but the gate was *not* locked. All that was necessary for the gate to be opened was a sufficient number of individuals attempt to push it open. But, due to the incentives and behaviors supported by the surrounding institutions, few had incentive to “push the envelope” (the gate), and observed behavior led to the *appearance* that the gate was closed. If the gate were not really locked, we would expect to see *ijtihād* in some aspects of law, particularly ones which fostered better economic outcomes (such as those studied by Gerber and Hallaq). However, the overwhelming cost of pushing the gate open when such pressures did not exist was the reason that the gate *seemed* locked. In turn, once inhibitive equilibria emerged in the tenth century, beliefs in the gate's closure were

supported. This insight allows us to view Islamic legal and economic history through a different lens by looking beyond the scope of observed actions to understand the institutions, behaviors, and incentives underlying them.[25]

VI. Conclusion

This paper analyzes the role that religious, political, and legal institutions have played in sustaining and undermining economically inhibitive religious laws in the Middle East and Western Europe. This analysis is inspired by the history of interest and printing restrictions in Islam and Christianity, both of which persisted for longer in Islam despite being economically inhibitive.

These histories suggest that a salient difference between the two religions' institutional structures is the greater degree to which political authorities are dependent on the dictates of the religious authorities for legitimacy in Islam. To better understand the consequences of this difference, I identify the salient players involved in the reinterpretation of religious doctrine (religious authorities, political authorities, and the "laity") and construct a model to identify their interactions under varying institutional conditions. The model's primary result is that when the level of dependence is significant, the institutions supporting economically inhibitive laws are more likely to be self-enforcing. In this case, political authorities are discouraged from permitting religiously banned actions, which in turn discourages the laity from transgressing the religious ban. With few individuals openly acting against its dictates, religious authorities have little incentive to reinterpret doctrine, and the institutional structure is self-enforcing – no player

[25] This analogy gains more weight when combined with Kuran's (1995) theory of preference falsification (PH #1), in which he argues that when ideas fall out of the mainstream, they can be forgotten or marginalized. If *ijtihād* fell into disuse due to a paucity of individuals "pushing the envelope", then it is much more likely to become forgotten and not brought up in every day discourse.

has incentive to "push the envelope". On the other hand, when the level of dependence is small, political authorities have incentive to permit productivity-enhancing, religiously banned actions, which in turn encourages the laity to transgress the religious ban. This provides greater incentive for religious authorities to reinterpret doctrine, and the institutional structure is self-undermining – the players "push the envelope" to the point that the law is eradicated.

The logic underlying these interactions and outcomes helps account for the salient (and often unanticipated) features of interest and printing histories. This framework also helps shed new light on a variety of historical phenomena in which the interactions between religious institutions and other institutions (political, economic, legal, and social) have affected economic outcomes. For example, it should aid our understanding of the differing paths that Islamic and Christian beliefs concerning slavery, insurance, and the economic role of women have taken in the last millennium, as well as the economic effects of the dependence of educational institutions on religious institutions. Concerning the latter, Easterlin (1981, p. 12-13) notes that "a deterrent to mass education appears to have been a situation in which the Roman Catholic Church exercised substantial secular power [in Latin America] … The rapid rise in mass education in Argentina after 1880 and in Mexico after 1920 both occurred in conjunction with a substantial shift in power from church to state. In the Middle East, Islam frequently appears to have been a negative influence in the development of formal schooling."[26] By analyzing the incentives and actions of all salient parties within the relevant institutional framework, we can better understand the features driving these important historical episodes.

While significant in their own right, especially given the role that unintended consequences can play in institutional development, studying these cases within the framework

[26] For more on the role that religion has played in creating incentives to acquire education, see Becker and Woessmann (2007) and Botticini and Eckstein (2007).

presented in this paper provides insight into a much broader economic reality. Contrary to the predilections of many previous scholars, this framework turns purely cultural explanations (based on the "conservative nature" of Islam) of the divergence between Western European and Middle Eastern economies on their head. That is, while we certainly see conservatism in the Islamic world, this phenomenon can be understood as a *result* of the institutional structures and not as a *cause* of economic stagnation.

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APPENDIX A: PROOFS

Proof of Proposition 1. I prove this proposition by contradiction. Assume that Proposition 1 is false, and imagine two economies, A and B, with corresponding parameters γ_A and γ_B, where $\gamma_A > \gamma_B$ and all other parameters are equal. Since $i_0^{PA,A} = i_0^{PA,B} = i_0^{RA,A} = i_0^{RA,B} = 0$, it must be that $i_1^{PA,A} \leq i_1^{PA,B}$ – the only difference between the two PA's optimization problem is γ. Thus, there must exist some period $\bar{t}$ in which $i_{\bar{t}-1}^{PA,A} \leq i_{\bar{t}-1}^{PA,B}$, $i_{\bar{t}}^{PA,A} > i_{\bar{t}}^{PA,B}$, and $i_{t^\circ}^{PA,A} > i_{t^\circ}^{PA,B}$ $\forall\, t^\circ \geq \bar{t}$.

The PA's first-order condition entails that $K_1^{PA} = c_1^{PA}$. From this, it follows that the equilibrium action i_t^{PA*} is increasing in i_{t-1}^{RA} and $\bar{a}_t$ (which is also increasing in i_{t-1}^{RA} and i_{t-1}^{PA}) and is decreasing in γ. Thus, $i_{\bar{t}}^{PA,A} > i_{\bar{t}}^{PA,B}$ can only hold if $i_{\bar{t}-1}^{RA,A} > i_{\bar{t}-1}^{RA,B}$. Moreover, in ARPE, $i_t^{PA,A} > i_t^{PA,B}$ can only hold *ad infinitum* if $i_{\bar{t}-1}^{RA,A} > i_{\bar{t}-1}^{PA,B}$ (it must be that $i_{t^*}^{RA,B} \geq i_{\bar{t}-1}^{PA,B}$ in some period t^*), so confine attention to this case. However, $i_{\bar{t}-2}^{RA,A} \not> i_{\bar{t}-1}^{PA,B}$ (otherwise, $i_{\bar{t}-1}^{PA,A} > i_{\bar{t}-1}^{PA,B}$). Thus, for the first period $t^* \geq \bar{t} - 2$ in which $i_{t^*}^{RA,B} \geq i_{\bar{t}-2}^{RA,A}$, it must be that $i_{t^*+1}^{RA,B} \geq i_{\bar{t}-1}^{RA,A}$ (unless

$i_{t^*}^{PA,B} > i_{\bar{t}-1}^{RA,A}$, in which case the proposition holds).[27] Hence, $i_{t^*+2}^{PA,B} \geq i_{\bar{t}}^{PA,A}$, so $i_{t^\circ}^{PA,A} \not> i_{t^\circ}^{PA,B}$ $\forall\, t^\circ \geq \bar{t}$: a contradiction.

Q.E.D.

Proof of Proposition 2. Consider two economies, A and B, with corresponding parameters γ_A and γ_B, respectively, where $\gamma_A > \gamma_B$ and all other parameters are equal. That is, $i_{t^\circ}^{RA,A} = i_{t^\circ}^{RA,B}$ and $i_{t^\circ}^{PA,A} = i_{t^\circ}^{PA,B}$ in some period t°. Assume that $i_{t^\circ}^{RA,A} < i_{t^\circ}^{PA,A}$, otherwise the results are trivial. Since L's actions are the same in both economies in period $t^\circ + 1$, $i_{t^\circ+1}^{PA,A} \leq i_{t^\circ+1}^{PA,B}$ and $i_{t^\circ+1}^{RA,A} = i_{t^\circ+1}^{RA,B}$.

Consider two cases. In the first, the RA in economy A reinterprets in period $t^\circ + 2$ such that $i_{t^\circ+2}^{RA,A} < i_{t^\circ+1}^{PA,A}$. Due to the concavity of L's optimization problem, the difference between any L's equilibrium actions (in period $t^\circ + 2$) in economies B and A *must* be less than or equal to $i_{t^\circ+1}^{PA,B} - i_{t^\circ+1}^{PA,A}$. Hence, $K_{11}^{RA} \to 0$ implies that $i_{t^\circ+2}^{RA,A}$ is closer to $i_{t^\circ+1}^{PA,A}$ than $i_{t^\circ+2}^{RA,B}$ is to $i_{t^\circ+1}^{PA,B}$.[28] This is exacerbated in the following period, as $K_{11}^{PA} \to 0$ entails that $i_{t^\circ+2}^{PA,B} - i_{t^\circ+1}^{PA,B} \geq i_{t^\circ+2}^{PA,A} - i_{t^\circ+1}^{PA,A}$, and thus L's evade the RA to a greater extent in economy B than they do in economy A. This case is repeated – with the RA's in the two economies making the same number of reinterpretations – until the second case is realized (and it must be realized, since the equilibrium is accepted religiously).

[27] There is one case in which this does not hold – when the RA in economy A interprets to accommodate the actions of a cluster of L's acting greater than $i_{t^*}^{PA,B}$ but the RA in economy B does not, as the marginal returns (K_1^{RA}) do not outweigh the marginal costs ($c^{RA\prime}$). In this case, it is possible that $i_{t^*+1}^{RA,B} < i_{\bar{t}-1}^{RA,A}$. Yet, this is where the assumption $K_{11}^{RA} \to 0$ has bite. Given this assumption, such a case cannot exist when the interpretation in economy B is accepted religiously (which it must be in some period). Here, the marginal returns cannot outweigh the marginal costs of reinterpreting to accommodate the cluster in A but not B.

[28] $K_{11}^{RA} \to 0$ is a stronger assumption than is necessary for this result to hold. A sufficient condition is: $K_{11j}^{RA} \leq 0\ \forall\, j$ (or K_{11j}^{RA} is not sufficiently positive).

In the second case, the RA in economy A reinterprets in some period $t^* \geq t^\circ + 2$ such that $i_{t^*}^{RA,A} \geq i_{t^*-1}^{PA,A}$. In this case, not only is it *not* necessarily true that $i_{t^*}^{RA,B} \geq i_{t^*-1}^{PA,B}$, but it may be such that $i_{t^*}^{RA,B} < i_{t^*-1}^{PA,A}$. d is (weakly) smaller at all interpretations for the RA in B than it is for the RA in A, and thus on the margin the former may have less to gain from such an interpretation. Hence, it must be true that the number of reinterpretations by the RA in economy A before it "reaches" a period t^* in which $i_{t^*}^{RA,A} \geq i_{t^*-1}^{PA,A}$ is weakly less than the number of reinterpretations by the RA in economy B before it "reaches" a period t^* in which $i_{t^*}^{RA,B} \geq i_{t^*-1}^{PA,B}$, *ceteris paribus*.

Q.E.D.

Proof of Proposition 3. This result follows directly from the proof of Proposition 2. In that proof, it was shown (in the "second case") that in the first period t^* in which $i_{t^*}^{RA,A} \geq i_{t^*-1}^{PA,A}$, it is *possible* that $i_{t^*}^{RA,B} < i_{t^*-1}^{PA,A}$. It follows that if such a period t^* exists, then $i_{t^*}^{RA,A} > i_{t^*}^{RA,B}$.

Q.E.D.

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FIGURES

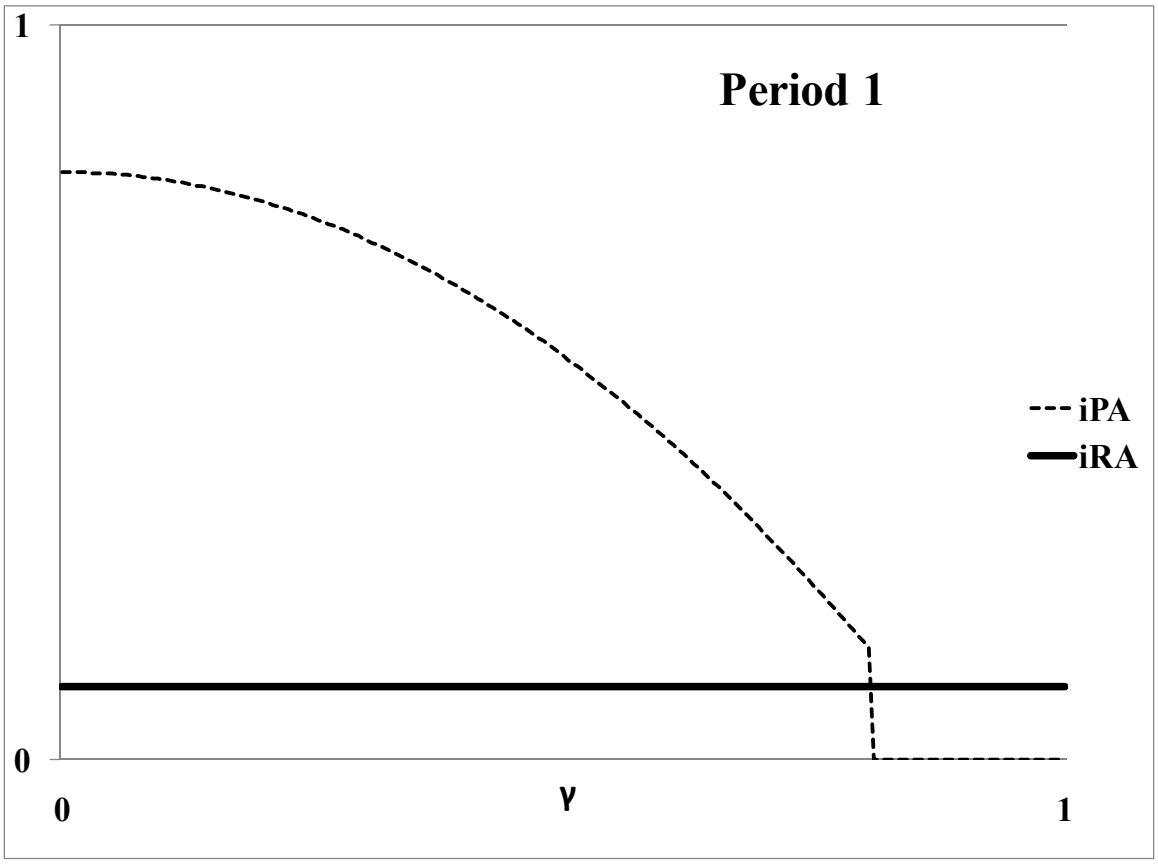
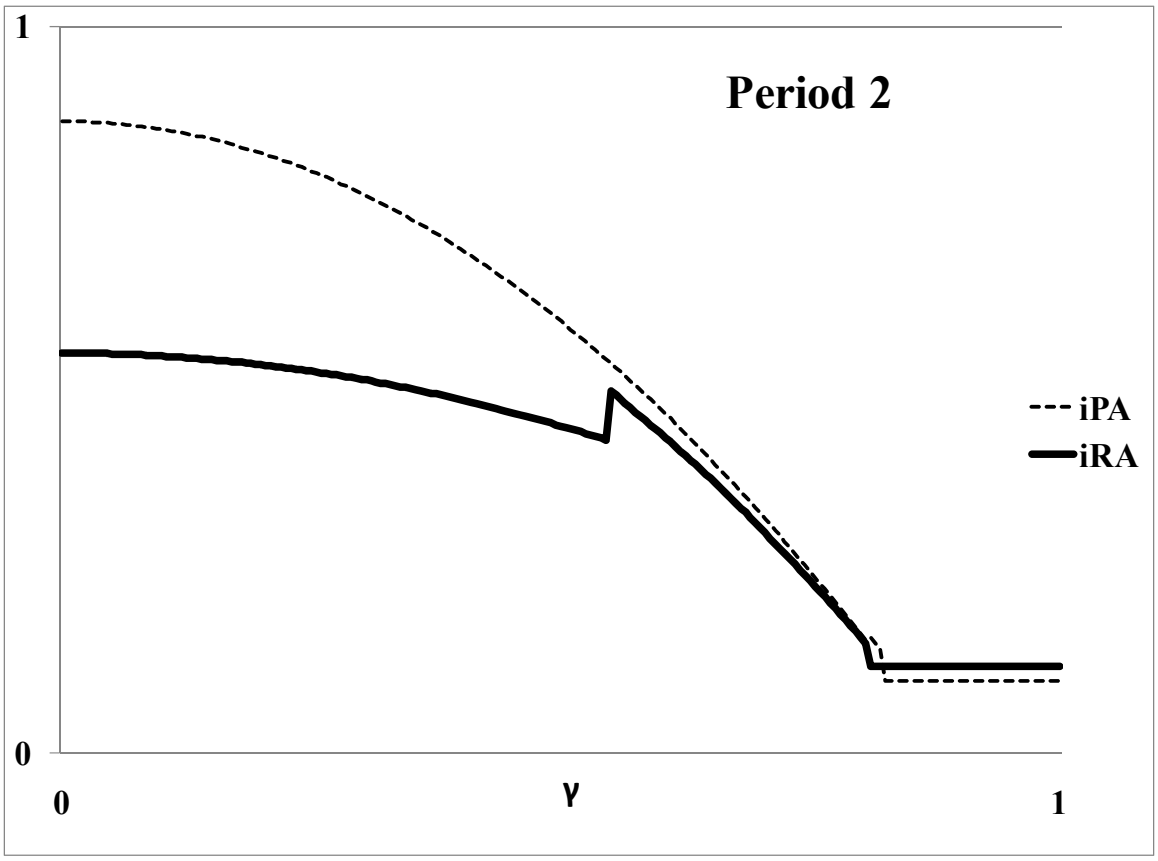


Figure I: Qualitative Representation of i^{PA*} and i^{RA*}, Period 1



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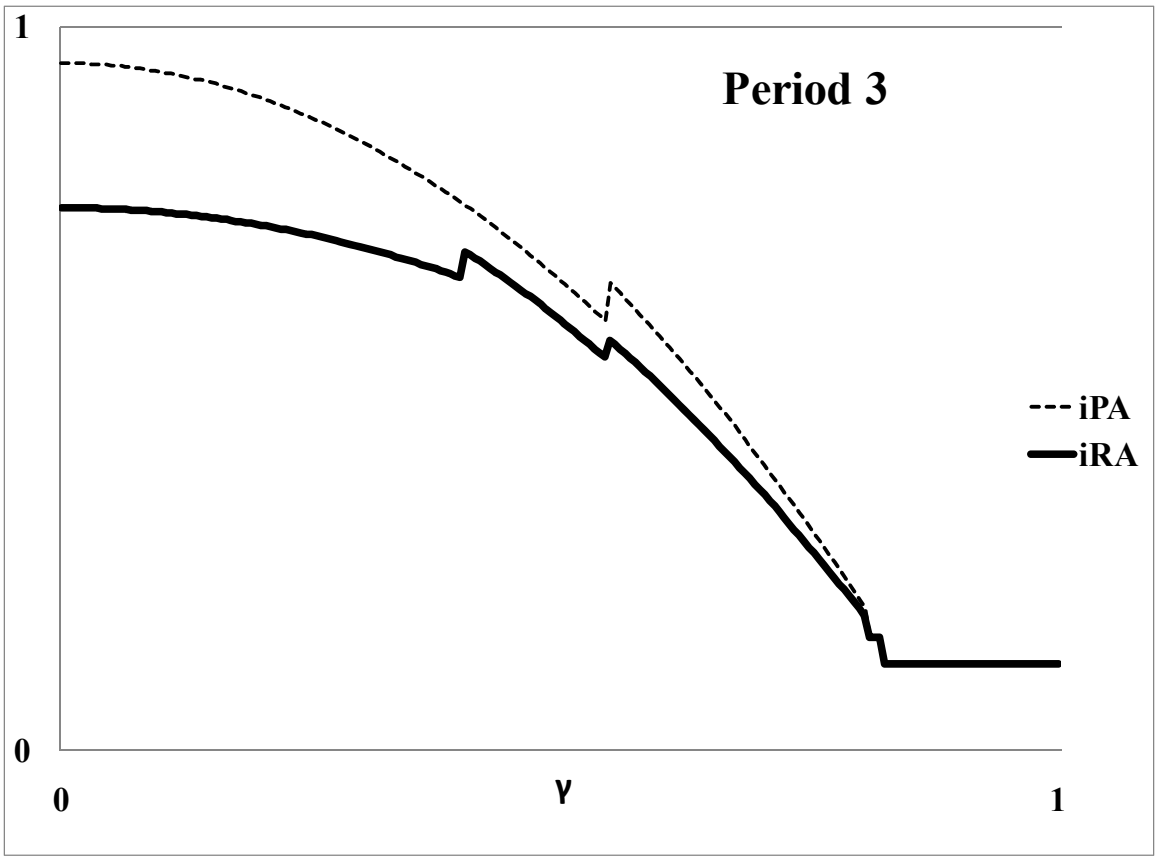

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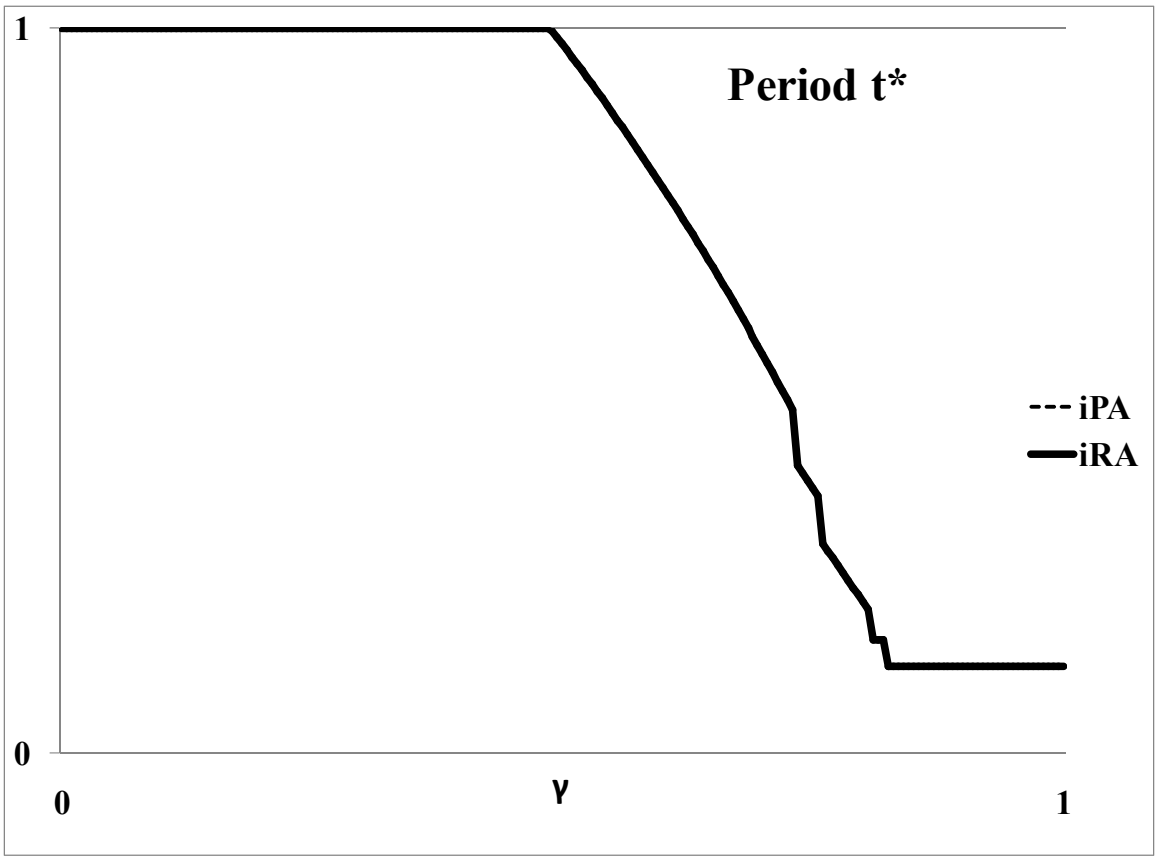

Figure IV: Qualitative Representation of i^{PA*} and i^{RA*}, Period t*