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An Economist's Guide to Heaven

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by

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Abstract

This paper is the first to offer an economic model of God and humanity as optimizing agents in the context of concrete belief archetypes (religious ‘contracts’) in Judeo-Christian theology. Data support the model’s unique predictions, despite their otherwise counterintuitive, unlikely nature. For example, the model requires that in one belief archetype, ‘good works’ *not* increase with strength of faith, as one might otherwise expect, and that what appears may be God’s dominant contract precisely balances divine penalties for renegeing on promises with incentives to seek divine ‘gifts’—an equivalence supported in the data.

Background

Few aspects of human behavior have escaped the scrutiny of economic analysis in recent decades. Religion is no exception. Iannaccone (1998) notes that more than 200 articles have been published on the economics of religion, examining topics from free riding in religious groups and their strategies for deterring free riding—for example, strict codes of behavior, dress, or belief—to the link between religious beliefs and economic outcomes.

Economists have also joined sociologists in prominent collaborations to study religious affiliation, participation, and other related phenomena: Stark, Iannaccone, and Finke, for example, examine the “secularization” of Europe (1994), the economics of church and state (1997), as well as religion, science, and rationality (2001), and Sherkat examines religious affiliation and mobility (2001) and religious orientation and participation(1998).

Despite such an extensive literature, one that dates back as far as Adam Smith, some of the most fundamental questions in religion remain unexamined by economists: in economic terms, for example, what is the relationship between self and God? How do our beliefs about that relationship affect behavior? We pursue answers to these questions, expressed in terms of economic models of optimizing behavior. As economists, our purpose is not to argue for a particular theological view, but to apply economic models of optimizing behavior to understand how beliefs about God can affect economic behavior. (Mangeloja (2003)) notes that much controversy also still surrounds the nature and strength of the links between religious beliefs and economic behavior, and Gruber (2005) notes the difficulty in parsing out structural relationships between religious beliefs on the one hand, and economic behavior and consequences on the other: Factors that affect religiosity are also likely to affect outcomes due to the correlation between religiosity and other factors, such as ambition, ability, and intelligence. Indeed, the

range and variability of empirical findings in the area illustrate this problem. Iannaccone (1998), for example, surveys a number of studies that suggest religious beliefs and affiliation and economic outcomes are interrelated, e.g., Hause (1971), Chiswick (1983), Neumann (1986), and Glaeser and Glendon (1998), and Lehrer (2004) is also a recent example. Even so, the direction of causality is unclear, Iannaccone argues, due to the paucity of theoretical structures that yield clear empirical predictions; Religious beliefs and affiliations are neither sufficiently defined in economic terms, nor explicitly linked to particular behavior or outcomes through a formal theoretical structure. In particular, Iannaccone (1998) argues, economists do not have much to say about *beliefs*.

One way of modeling religious beliefs is to introduce both individual and divine utility functions, where individual perceptions of divine utility reflect beliefs. Even so, only two works, Brahm (1980) and Oslington (2005), model divine preferences, and only the latter models both divine and human utility. The former, Brahm (1980), models divine preferences without giving them an explicit representation. Briefly, God values belief over nonbelief, tests individuals by giving them genuine choices in which they may renege on promises and imposes constraints on human activity. Oslington (2005) poses the problem as a divergence between the preferences of God and those of individuals; faith is implicit and expressed as conformity to divine will. Our formal approach here more closely matches Oslington's work, in that God engages in optimizing behavior and gains utility from 'good works', but we expand that approach by considering concrete belief archetypes from Judeo-Christian theology about the relationship between God and humanity and by conducting formal tests of the model's predictions. We consider four primary belief archetypes and test their predictions using individual survey data.

The use of an explicit theoretical model incorporating both God and humanity and the application of empirical tests of those predictions distinguish this study from prior work.

Even so, In addition to relying on the strength of model's predictions to help sort the 'wheat from the chaff' (of spurious correlation), our tests also focus on two central predictions that either run *counter* to intuitively likely correlations (e.g. that good works do *not* rise with strength of religious faith among believers), or that at a minimum, are unlikely to arise spuriously by chance. For example, the belief archetype that appears to be the dominant 'contract' for God in our model avoids the necessity of imposing a divine penalty to deter renegeing (both undesirable to God) by *precisely* balancing humanity's incentives to avoid divine penalties with incentives to seek divine gifts—a balance that appears unlikely to arise by chance.

To be clear, though, several points should be clarified before proceeding. We use the term 'humanity's perception of God' and 'God' as an entity interchangeably. Similarly, we use 'humanity' and 'self' interchangeably. Also, while some may find the application of economic methods to religion distasteful or possibly even offensive, neither is our intention, despite our facetious title: "The Economist's Guide to Heaven"—inspired by the provocative book, "God the Economist," (Meeks, 1999). Subsequently, we have also become aware of 'Is God an Economist,' Wagner (2009). For both God and humanity, behavior in our model follows the standard economic paradigm – each is characterized as an optimizing agent in the context of concrete archetypes of Judeo-Christian beliefs. The results of our application of an economic model and empirical tests to religious beliefs and behavior may surprise both those critical of an economic approach and those sympathetic to it, alike: among believers, for example, we find a central, possibly dominant, role for a belief archetype involving transforming' faith and divine 'gifts'—a result not likely anticipated by either view of the application of rational-choice

approaches to religion. Of course, no model can fully capture the rich theology of any major religion, and Judeo-Christianity is but one of the world's great religious traditions. Our theoretical objective is modest: to capture a few essential aspects of Judeo-Christian beliefs in economic terms simple enough form to yield clear, testable predictions; many details of the model are necessarily secondary to that objective.

The Model

Assumptions

Individuals act to maximize utility, which depends positively on consumption of a generic composite good (C) and production of good works (G), as described in equation (1) below.² Equation (1) also contains a term V, determined by God. This term represents the possibility of a direct, divine augment to human utility, as discussed further below. Individuals maximize a simple linear utility function of the form:

$$(1) \quad U = C + hG + V$$

C may be produced with human labor or provided by God as a gift or reward. Human production of C (C_H) is subject to a linear (constant returns to scale) relationship between the amount of labor (time or effort) an individual devotes to producing goods (L_C) and the amount of the good produced (C_H). The parameter δ measures individual productivity in producing consumption goods, either directly or indirectly:

$$(2) \quad C_H = \delta L_C$$

Good works (G) can only be produced using humanity's labor:

$$(3) \quad G = L_G L_C$$

Labor devoted directly to good works (L_G) and labor devoted to producing C (L_C) are complements in producing good works. Positive inputs into the production of both C and good works are necessary for good works to be performed, i.e., they are complements for example, in the sense that works and rest or work and food are complements in producing 'effective' labor time. In choosing L_G and L_C , individuals may not exceed the total amount of time available, denoted L (e.g., 24 hours a day):

² The composite good C may include both tangible and nontangible, or spiritual goods.

$$(4) \quad L_G + L_C = L$$

God may use three instruments to influence individual behavior in the model—rewards (b), penalties (T), and gifts (V). The “gift” is a direct, divine augment to utility. God rewards individuals for labor devoted to good works. This reward is in units of C and for simplicity, is assumed to take the linear form:

$$(5) \quad C_G = bL_G$$

The parameter b is the reward God promises to provide for time devoted to good works, and C_G denotes the total C promised by God in exchange for time spent in good works. God may penalize individuals who renege on their promises. The penalty, T, takes the form of a lump-sum reduction in C, and may also choose to make gifts to humanity (V), as explained below, which directly increase individual utility.

God derives utility from good works and disutility from invoking penalties instead of bestowing gifts. Individuals, indexed by i, contribute to God’s welfare through the performance of good works. For convenience, God’s utility function, Ω , is defined (or perceived) as the simple sum of the good works produced by humanity less a fixed disutility, ε , which is positive and finite if God must use a penalty:

$$(7) \quad \Omega = \sum_{i=1}^N G_i - \varepsilon \quad \text{for } i=1, N:$$

Believers and Nonbelievers

Individuals are born as either believers or nonbelievers. Believers are born as either trusting, those who believe God's promises, or doubting, those who believe in God but do not trust God's promises.³ Any type of believer may renege on promises to God.

For believers, total human consumption, C , includes not only goods produced with individual labor, $C = \delta(L_C)$, but also rewards from God for time committed to goods works, $C_G = b(L_G)$, less penalties (T) for renegeing on agreements with God. That is,

$$(7) \quad C = \delta(L - L_G) + L_G - T$$

For nonbelievers, individual consumption is:

$$(8) \quad C = \delta(L - L_G)$$

Information

Without cost, God observes each individual's status as a believer or nonbeliever, utility functions, and actual behavior. Furthermore, God understands the basis for individual action – optimizing behavior subject to constraints – and the effect divine rewards and gifts have on individual behavior. Individuals believe God offers alternative relationships, or arrangements to humanity, knowing that believers maximize utility subject to the terms of an arrangement. Thus, individuals evaluate God's offer based on whether they trust God's promises, respond to God with promises of their own, and make time/resource allocation decisions to maximize their utility. Their utility maximizing decisions depend on God's choice of reward (b) and gift (V), in the case of believers, but are independent of those choices for nonbelievers. Individuals only observe the utility of others who accept the same type of contract, including 'no contract' in the case of nonbelievers. Payoffs are realized after decisions are complete.

³ The assumption that 'belief' is innate in origin appears consistent with recent evidence on genetic origins of belief, the so-called 'God gene' described in Hamer (2005).

Contracts and Outcomes

We consider four primary belief archetypes (‘contracts’) in Judeo-Christian theology, which we assume God offers to induce individuals to increase good works, where, again, we use God and individual perceptions of God interchangeably. Empirically, these belief archetypes are associated with particular religious affiliations. Biblical context for the specific belief archetypes and details of the church-sect typology we use to infer which religious contract a respondent is identified with are provided in a data & biblical appendix, available to interested readers by request.

1 Ex Post Contracts

Under ‘ex post’ contracts, rewards are conditional on observed individual actions and delivered ex post if the terms of the contract are kept. Under an ex post contract God promises to pay a “price” b for each unit of labor spent on good works. Trusting believers, doubting believers, and nonbelievers respond to the offer in different ways. Hence, from humanity’s perspective, God solves the following problem:

$$\text{Max } \Omega = \sum G_i \text{ subject to } L_G = L_G^T$$

Where L_G^T solves the maximization problem for trusting believers:

$$\begin{aligned} \text{Max } & U = C + hG \\ & L_G, L_C \\ \text{s.t.} & \\ & L_G + L_C = L \\ & C_H = \delta L_C \\ & C_G = bL_G \\ & C = C_H + C_G \\ & G = L(L - L_G) \end{aligned}$$

with these first-order conditions for an interior maximum:

$$\frac{dU}{dL_G} = 0 = -\delta + hL - 2hL_G + b$$

$$L_G^H = \frac{L}{2} + \frac{(b - \delta)}{2h}$$

$$L_E^H = \frac{L}{2} - \frac{(b - \delta)}{2h}$$

With ‘free will’, these conditions pose constraints to God’s optimization, which yields God’s first-order condition with respect to b, the reward for good work:

$$\frac{d\Omega}{db} = 0 = -\frac{1}{2} \frac{b - \delta}{h^2}$$

Doubting believers, who do not trust God’s promises, and nonbelievers, who do not believe the reward (b) exists are both unresponsive. Neither group responds to God’s promises with additional time spent in good works; the first-order condition for an interior maximum for doubting believers and nonbelievers does not contain b:

$$\frac{dU}{dL_G} = 0 = -\delta + (h)L - 2(h)L_G$$

$$L_G^H = \frac{L}{2} - \frac{\delta}{2h}$$

$$L_E^H = \frac{L}{2} + \frac{\delta}{2h}$$

A corner solution arises if $(\delta/h) > L$. When the ratio of the marginal productivity of L_C in producing C to the marginal utility of good works, (δ/h) , is sufficiently high, both doubting believers and nonbelievers set L_G , the input into good works, at 0 and set L_C , the input into production of C, at L. First-order conditions for ex post contracts are presented in Table 1, and their implications are summarized below for individuals with varying strengths of belief:

General Observations for Ex Post Contracts

i) Strength of faith among believers is relevant. Trusting believers respond to God’s promise by putting more resources into good works than either doubting believers or nonbelievers.

ii) Both doubting believers and nonbelievers are unresponsive.

iii) Indeed, doubt and nonbelief are equivalent. Doubting believers are no better off than nonbelievers. Both are unresponsive and have equivalent good works, all else the same.

iv) God optimizes, by setting $b = \delta$

v) God is better off when humanity has faith in his promises; faith leads to increased good works, increasing God's utility, at least from humanity's perspective.

2. Ex Ante Contracts without a Penalty

Because only trusting believers respond to God's promises under an ex post contract, God offers 'ex ante' contracts, in which rewards are offered ex ante, with a price conditional on promise of future performance. Ex ante contracts can be with or without a penalty. In an ex ante contract without a penalty, God is perceived as offering rewards 'up front', inducing doubting believers to enter into the contract, and trusting and doubting believers behave equivalently in the absence of a penalty, because all believers have an incentive to renege on promises and reduce good works, consuming 'up front' and then devoting additional labor to own production of consumption. Thus, all believers gain additional utility by renegeing on good works; First-order conditions are now identical for all individuals:

$$\frac{dU}{dL_G} = 0 = -\delta + (h)L - 2(h)L_G$$

$$L_G^H = \frac{L}{2} - \frac{\delta}{2h}$$

$$L_E^H = \frac{L}{2} + \frac{\delta}{2h}$$

The first-order conditions for contracts with rewards delivered ex ante are given in Table 2 for interior solutions, with their implications summarized below:

General Observations for Ex Ante Contracts without a penalty

- i) Strength of faith among believers is now irrelevant: all believers renege.
- ii) Even trusting believers renege. Trusting believers also take the ex ante reward, and then renege, yielding greater utility than doubting believers or nonbelievers.
- iii) With no penalty, doubting believers are better off than nonbelievers:

If doubting believers take God's ex ante contract and then renege, they are better off than nonbelievers, who remain unresponsive.

3. Ex Ante Contracts with a Penalty

Knowing that individuals have an incentive to renege on ex ante contracts, God invokes a penalty for renegeing on promises of good works. The penalty is chosen by God to just induce believers at the margin to keep their promises and increase good works to meet the terms of the contract. Under this arrangement, all believers are now responsive to God's promises. However, God's utility is reduced, at least from humanity's perspective by the imposition of a penalty, and first-order conditions are summarized in Table 3 when the penalty is set just high enough to induce trusting and doubting believers to change the time spent in good works to the level chosen in ex post contracts, that is: $L_G = L/2$.

Implications of these conditions are summarized below:

General Observations for Ex Ante Contracts with Penalty

- i) The effect on God's utility is indeterminate. The additional good works increase God's utility, but the penalty reduces God utility. Whether God's utility increases or not is indeterminate.
- ii) Believers are responsive, and no longer renege: The penalty eliminates the incentive to renege and results in greater good works and utility for believers than nonbelievers.
- iii) All believers are better off than nonbelievers. Believers receive additional utility from both

a higher level of good works and C.

iv) *Doubting believers behave like trusting believers, rather than nonbelievers.* The combination of an ex ante contract with a sufficiently large penalty induces doubting believers to behave like trusting believers.

v) *As before, nonbelievers are unresponsive.* All else the same, nonbelievers' choices lead to fewer good works and lower utility than for believers because they do not participate in God's rewards.

4. Covenants

God can offset incentives to renege in an ex ante contract by imposing a penalty for doing so, but the penalty represents disutility to God. However, God can avoid the need to impose penalties by offering a 'covenant'—a direct divine augment to utility, offered conditional on 'transforming faith', that is, faith sufficient to preclude renegeing. (trusting believers in a covenant for example, may believe that God 'sees' any inclination to renege, which would exempt them, from the perspective of their own belief, from receiving the divine gift promised in the covenant). If the direct augment is sufficiently high at the margin, believers in a covenant produce good works in covenants equivalent to those under an ex ante contracts with a penalty. That is, by design, incentives to avoid divine penalty are precisely balanced with incentives to seek divine gifts, so that all else the same, the level of good works in a covenant is the same as in an ex ante contract with a penalty but without requiring a penalty. The first-order conditions for a covenant are summarized in Table 4, and their implications are summarized below:

General Observations for Covenants:

- (i) *Covenants, ex post and ex ante contracts(with penalty) are*
- (ii) *equivalent* : good works in rows 1-3 are now identical.

(iii) Utility is higher for believers than for nonbelievers for an interior solution.

(iv) God and all believers are at least as well off as with an ex ante contract with a penalty, for $V > (\delta^2 / 4h)$.

Testable Hypotheses

We focus on tests of three central predictions of the model using self-reported data for strength of faith and contract type (as identified by religious affiliation), income, religious donations, religious attendance, and other standard demographic controls:

H1: Strength of faith is irrelevant among believers in ex ante contracts without a penalty. (all believers renege).

H2: Ex ante contracts without a penalty do not ‘work’ (believers renege if there is no penalty), so without a penalty, ‘good works’ are lower among believers in ex ante contracts than in ex post contracts)

H3 Covenants ‘work’ (by design, good works under a covenant are as high as in ex ante contracts with a penalty, but without requiring a penalty, which represents disutility to God).

We are particularly interested in tests of (1) and (3) because they require particularly strong, or counterintuitive results: (1) requires that contrary to priors, good works among believers *not* increase with strength of faith, and (3) requires that the prospect of *gifts* promised by God under a covenant and the prospect of penalties for renegeing on promises in an ex ante contract induce equivalent levels of good works, a result that appears unlikely to arise purely by chance. Hence, we have no reason to suspect that either of these two implications of the model is likely to arise spuriously in the data.

Data and Empirical Specifications

Following work by Iannaccone, we use individual cross-sectional data from the General Social Science Survey (GSS), which the National Opinion Research Center initially conducted in 1972. The data are independently drawn from approximately 1500 personal interviews with English speaking, non-institutionalized people in the U. S. ages 18 or older. In addition to questions concerning religious preferences, asked over the entire period, the survey asked a variety of additional questions in the subsequent years of 1991 and 1988 concerning the degree of faith in God, religious donations, participation in religious activities, and belief in heaven, hell and the devil. The GSS data include nonbelievers, as well. Analysis is restricted to the years 1988 and 1991 because only those years include relevant measures of good works (religious donations, and attendance) . We rely primarily on the 1991 data because beliefs in hell or the devil, useful for assessing the effects of beliefs in penalties, are recorded only in 1991. Even so, we also perform secondary tests based on a reduced specification and the less comprehensive 1988 data. Our tests focus either on the model's counterintuitive predictions for the role of strength of faith for a given contract type, or on the role of religious affiliation and contract type for a given strength of faith. The tests suggest substantial power for the model's predictions. As a general proposition, our model suggests that an individual's investment of time in good works depends on both strength of faith and beliefs about the nature of the divine contract.

We use religious donations and participation as measures of good works because they are readily available in the GSS data, while other potentially useful measures, such as non religious volunteer time or donations to other charitable groups or activities, are not.

S, Our two alternate measures of good works are the percentage of income donated to religious organizations or activities and the approximate percentage of the year devoted to religious

attendance and activities. Explanatory variables include self-reported measures of strength of belief, beliefs about the divine contract, as revealed by religious affiliation, and interactions of the two. We are particularly interested in the interactions because comparisons of the interaction terms form the basis for the empirical tests of the model's predictions. To capture strength of faith, the specification includes binary variables identifying 'trusting believers' (TB), 'doubting believers' (DB), and 'nonbelievers' (NB), as identified from self responses. Specific definitions of these and other variables are presented in a data Appendix. Individuals also implicitly report (via religious affiliation) the type of contract he or she believes they have accepted from God, if any: that is, an ex post contract (EXP), an ex ante contract without a penalty (EXA), an ex ante contract with a penalty (PEN), a covenant (COV), or no contract (NOC).⁴

Trusting and doubting believers may enter into ex post contracts (TBEXP, DBEXP, respectively, ex ante contracts without a penalty (TBEXA, DBEXA, respectively), ex ante contracts with a penalty (TBPEN, DBPEN, respectively), or covenants (TBCOV, DBCOV, respectively). The reference category includes nonbelievers (NB) who choose not to enter into a contract (NOC). Again, variable definitions are provided in Table 5 Summary statistics are reported in table 6. Our full base specification, eq. (9) below, includes these interaction terms, along with the main effects for strength of faith and religious 'contract' variables, but the results are robust to an expanded specification that includes extensive individual controls for prior religious experience, race, gender, marital status, employment, family background, and geographic region:

$$(9) GW_i = (\beta_0 + \beta_1 TB_i + \beta_2 DB_i + \beta_3 COV_i + \beta_4 EXA_i + \beta_5 EXP_i + \beta_6 PEN_i + \beta_7 COV_i + \beta_8 TBEXP_i + \beta_9 TBEXA_i + \beta_{10} TBPEN_i + \beta_{11} DBCOV_i + \beta_{12} DBEXP_i + \beta_{13} DBEXA_i + \beta_{14} DBPEN_i + \varepsilon_i)$$

⁴ biblical context for the contract archetypes is provided in a biblical appendix, available by request.

Our model's three key hypotheses are specified below in terms of the interaction terms between given strengths of faith and specific religious contracts, as identified from religious affiliation:

H1 $\beta_9 = \beta_{13}$ (strength of faith is irrelevant in ex ante contracts with no penalty).

H2 ($\beta_8 > \beta_9, \beta_{12} > \beta_{13}$) ex ante contracts don't 'work' without a penalty: (good works in EXP contracts > than in ex ante contracts with no penalty for both TB and DB).

H3 covenants 'work' ($\beta_7 = \beta_9, \beta_{11} = \beta_{14}$) (good works in COV= those in EXA with a penalty, but require no penalty).

Church-sect typology

A key step in our empirical specification is identifying individual beliefs about the type of religious 'contract' they have chosen. However, there are no questions in the GSS data regarding religious 'contracts', in the sense of our model. To infer contract type from religious affiliation, we rely on prior work on church-sect typologies of beliefs, e.g., Iannaccone (1998), and Johnson (1953, 1967), further augmented by interviews of Ben Johnson (2009), arguably the leading scholar on church-sect typology in the sociology of religion.⁵ Iannaccone distinguishes among liberal Protestants, conservative Protestants, and Catholics. Why does the church-sect typology take this shape? Azzi and Ehrenberg's early study (1975) suggests that expected after-life rewards may be higher for 'strict' conservative cohorts and may result in increased attendance and contributions. Some have suggested that another reason for this typology may lie in the 'addictive' effects of religion (in the Becker sense); 'strict' conservative groups acquire greater religious human capital, yielding higher religious attendance and donations

⁵ Johnson (2009)

⁸ Results in Table 6 are also broadly consistent with an earlier studies of church attendance, e.g., (Long and Settle (1977) and Lipford and Tollison (2003).

There is both empirical merit and precedent for this approach. Glaeser and Glendon (1998) for example, appear to identify Catholicism with ex post contracts in which good works are motivated by 'the future reward of getting into heaven'. There is historical precedent for this distinction as well; at the time of the Reformation, Protestants distinguished themselves from Catholics by stressing (in our terminology) the importance of transforming faith and need for covenants rather than ex post contracts. Similarly, liberal Protestantism is associated with higher critical biblical scholarship which appears consistent with ex ante contracts in which God demonstrates promises 'up front' to motivate acceptance of the contract. Thus, we assume that individual differences in religious affiliation are highly correlated with variations in religious beliefs. We proceed by identifying Catholics with ex post contracts; liberal Protestants and Jews with ex ante contracts without a penalty; conservative Protestants with covenants, and respondents who think the devil definitely exists with ex ante contracts with a penalty. A complete listing of contract variables by religious/denominational type is provided in a data appendix available to interested readers. The omitted contractual category, 'no contract,' includes respondents answering 'none or other.'

Complete data for 1988 comprise 891 observations, and complete data for the year 1991 comprise 918 observations.

We begin with estimates of the full specification of eel (9) using data for 1991 and religious attendance as the measure of good works because data for religious donations are not available in 1991, which precludes using donations as a measure of good works in 1991, and data for beliefs in the devil or hell are not available in 1988, which precludes using the 1988 data to estimate the full specification. However, we are able to estimate a reduced specification for a second year with 1988 data that excludes any penalty-related variables. This reduced

specification has the disadvantage of not permitting any tests of penalty-related parameters, but it does permit other key tests, while also offering one key advantage: The 1988 data contain information for *both* religious donations and religious participation. We exploit this feature using canonical correlation, which yields both an estimate of the marginal tradeoff between religious attendance (‘time’) and donations (‘ money’) as measures of good works and tests of a subset of the model’s predictions based on a broader measure of good works, a canonical composite of religious attendance and donations)

Religious attendance in the 1991 data is divided into nine categories; including never, less than once per year, once per year, several times per year, once per month, two to three times per month, nearly every week, every week, and more than once per week, so we construct an approximately continuous variable from these categories that measures the approximate percentage of yearly attendance and takes a value of zero if the respondent never attends, two if the respondent attends less than once per year, once per year or several times per year, twenty five if the respondent attends once per month or two to three times per month and 100 if the respondent attends every week, or nearly every week, or more than once per week. This scale is consistent, but arbitrary, and likely overstates the proportion of time spent in religious activities, if measured in hourly increments, but this issue does not pose a problem, because all our hypothesis tests are based on *relative* magnitudes of coefficients and hence, scale invariant. Again, variables are defined in the data and biblical appendix, available by request. Summary data for the regression and Tobit variables are presented in Table 5.

Estimation

Our measure of good works in 1991 (ATT) is a latent variable, observed only for non-negative values. However both OLS and Tobit estimates of eq.(9) are presented in Table 6; some

of our cell sizes are small, so we prefer OLS for its small-sample properties, unless significant bias is indicated by Tobit estimates, and we expect little bias, because the proportion of observations with zeros is small (<30%) in the data. Even so, we compare the OLS and Tobit estimates in Table 6 to assess whether bias in the OLS estimates is, in fact, small.

The ordinary least squares (OLS) and (marginal) Tobit coefficients for the full model specification and the 1991 data are presented in columns (1) and (2), respectively of Table 6, with religious attendance/participation as the dependent variable. The OLS and Tobit (marginal) coefficients exhibit generally similar values, suggesting little bias for OLS. The similarity is evident in two ways. First, significant coefficients in the Tobit estimates are generally associated with significant coefficients in OLS and insignificant coefficients in Tobit are associated with insignificant coefficients in OLS. Second, when both coefficients are significant, their magnitudes tend to be similar. Most importantly, for the fully specified model, the patterns of significance and coefficient magnitudes are equivalent for the interaction terms, which are the only coefficients relevant to our hypothesis tests. Consequently, we rely on OLS due to its greater power in small samples, and again, results are robust to whether or not an expanded set of standard demographic controls (e.g., gender, race, age, marital status, geographic region, and house hold income) are included.

Hypothesis Tests

based on the estimates in Table 6, tests of our three major hypotheses are consistent with the model predictions: Even so, we focus primarily on hypotheses 1 and 3, our two most central and powerful predictions.⁸ Hypothesis 1, the model's most counterintuitive prediction, is not rejected ($p < .05$) : without a penalty for renegeing in ex ante contracts, strength of faith among believers is irrelevant for good works, measured as religious attendance and participation, even though the

independent effects of strength of faith (coefficients for TB and DB) are substantial in magnitude, and statistically significant from both zero and each other, which suggests substantial power for the tests. In addition, hypothesis 3, that covenants ‘work,’ and arguably, the least likely to arise merely by chance, is also not rejected: for a given strength of faith among believers, attendance, the measure of good works in Table 6, does not differ significantly between covenants (which promise divine gifts for transforming faith) and either ex ante -tracts with a penalty (which promise divine penalties for renegeing on promises of good works) or ex post contracts). Furthermore, one also cannot reject the hypothesis 2, that penalties ‘work’: among believers with a given strength of faith, attendance is significantly higher in ex ante contracts with a penalty than without, so failure to reject hypothesis 3 does not appear solely due to low power, since this related test does discriminate successfully between ex ante contracts with and without a penalty.

We turn now to a broader, composite measure of good works, a canonical correlation for ATT and GIV, available together only in 1988), along with a subset of the independent variables from eq. (9) available for use in the restricted specification. This estimator permits us to conduct robustness tests of a subset of our hypotheses, hypotheses 1 and 3, for a broader measure of good works, while also yielding an estimate of the tradeoff between the two, if only for a restricted specification that excludes any penalty-related variables, (questions dealing with belief in the devil or hell were not asked in 1988) . Still, we are able to test hypotheses 1 and 3 in the restricted specification.

Income is reported only as a categorical variable in , so we construct an approximately continuous income variable, with values taken from the midpoint of each income category ranging from \$5,000 to \$65,000. This approach likely understates income for the top range, and

overstates it for the bottom range, but these ranges account for a small minority of our observations. We employ canonical correlation, which permits us to test hypotheses using both measures of good works simultaneously. Canonical correlation estimates the linear combination of dependent variables (in this case, religious donations and attendance) and independent variables (strength of belief and contractual variables with their interactions) that maximizes the correlation between the two. (Theil (1971), 317-318) Canonical correlation is valuable here for several reasons. It allows for a two-dimensional measure of good works consisting of both religious donations and attendance, rather than a uni-dimensional measure and yields an estimate for the tradeoff, if any, between time and monetary donations. It also provides an opportunity to gauge the robustness of our tests of hypotheses 1 and 3, those not involving penalties, in a different context—one based on a two-dimensional ‘composite’ measure of good works.

Table 7 presents estimates based on the canonical correlations.⁹ The results exhibit a negative tradeoff between time and money used for religious purposes, and the upper and lower bounds of the 5% confidence intervals for the canonical weights for religious donations and attendance imply a (negatively) elastic tradeoff over the full range.¹⁰

The tests we are able to perform for the canonical correlations in Table 7 are also consistent with the model predictions: the canonical estimates do not reject hypothesis 1, the notion, at the heart of our model, that in the absence of a penalty for renegeing in ex ante contracts, all believers face an incentive to renege, so strength of faith among believers is irrelevant to good works. The canonical estimates also do not reject hypothesis 3, that levels of

⁹ Given little evidence of bias for OLS in Table 6, we also presume little bias for canonical correlation in Table 7.

¹⁰ A confidence interval for the elasticity is not estimated directly because the variance of the elasticity, a ratio of two random normal variables, is ill defined, and fortunately, none of our formal hypothesis tests rely on the elasticity.

good works are equivalent in covenants and ex post contracts. However, unlike our hypothesis tests for the OLS results in Table 6, where the power of the tests appears strong, power for the tests based on the canonical results appears weaker. Even so, results for the two sets of tests coincide, despite substantively different specifications, so with, any issue with the difference in power is a moot issue.

More broadly, trusting believers appear less responsive to sanctions than doubting believers, but appear just as willing to renege and reduce good works in ex ante contracts if there is no real or perceived penalty for doing so, e.g., good works of trusting believers are no greater under ex ante contracts *with* a penalty than without.

Concluding Remarks

This study provides an economic model and empirical evidence of systematic links between major archetypes of Judeo-Christian beliefs and optimizing economic behavior for both God and humanity. Empirical tests of otherwise unlikely, counterintuitive predictions of the model lend support to the power of economic models of the links between religious beliefs and behavior.

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Table 1. First-Order Conditions: Ex Post Contracts.

Trusting Believers $(\delta/h) < L$	Doubting Believers Nonbelievers $(\delta/h) < L$
$L_G = \frac{L}{2}$	$L_G = \frac{L}{2} - \frac{\delta}{2h}$
$b = \delta$	
$G = \frac{L^2}{4}$	$G = \frac{L^2}{4} - \frac{\delta^2}{4h^2}$
$U = \delta L + h \frac{L^2}{4}$	$U = \frac{\delta L}{2} + h \frac{L^2}{4} + \frac{\delta^2}{4h}$
$\Omega_B = \sum_B \left(\frac{L^2}{4} \right)$	$\Omega_{NB,DB} = \sum_{NB,DB} \left(\frac{L^2}{4} - \frac{\delta^2}{4h^2} \right)$

See text for explanation of parameters and variables.

Table 2. First- Order Conditions: Ex Ante Contracts No Penalty

Trusting Believers Doubting Believers $(\delta/h) < L$	Nonbelievers $(\delta/h) < L$
$L_G = \frac{L}{2} - \frac{\delta}{2h}$	$L_G = \frac{L}{2} - \frac{\delta}{2h}$
$b = \delta$	
$G = \frac{L^2}{4} - \frac{\delta^2}{4h^2}$	$G = \frac{L^2}{4} - \frac{\delta^2}{4h^2}$
$U = \delta L + h \frac{L^2}{4} + \frac{\delta^2}{4h}$	$U = \frac{\delta L}{2} + h \frac{L^2}{4} + \frac{\delta^2}{4h}$
$\Omega_B = \left(\frac{L^2}{4} - \frac{\delta^2}{4h^2} \right)$	$\Omega_{NB} = \sum_i \left(\frac{L^2}{4} - \frac{\delta^2}{4h^2} \right)$

See text for explanation of parameters and variables.

Table 3. First-Order Conditions: Ex Ante Contracts with Penalty.

Trusting Believers	Nonbelievers
$L_G = \frac{L}{2}$	$L_G = \frac{L}{2} - \frac{\delta}{2h}$
$b = \delta$	
$G = \frac{L^2}{4}$	$G = \frac{L^2}{4} - \frac{\delta^2}{4h^2}$
$U = \delta L + h \frac{L^2}{4} + \frac{\delta^2}{4h} - T$	$U = \frac{\delta L}{2} + h \frac{L^2}{4} + \frac{\delta^2}{4h}$
$\Omega_B = \sum_B \left(\frac{L^2}{4} \right) - \varepsilon$	$\Omega = \sum \left(\frac{L^2}{4} - \frac{\delta^2}{4h^2} \right)$

See text for explanation of parameters and variables.

Table 4. First-order Conditions: Covenants

Trusting Believers Doubting Believers $(\delta/h) < L$	Nonbelievers $(\delta/h) < L$
$L_G = \frac{L}{2}$	$L_G = \frac{L}{2} - \frac{\delta}{2h}$
$b = \delta$	
$G = \frac{L^2}{4}$	$G = \frac{L^2}{4} - \frac{\delta^2}{4h^2}$
$U = \delta L + h \frac{L^2}{4} + V$	$U = \frac{\delta L}{2} + h \frac{L^2}{4} + \frac{\delta^2}{4h}$
$\Omega_B = \sum_B \left(\frac{L^2}{4} \right)$	$\Omega_{NB} = \sum_{NB} \left(\frac{L^2}{4} - \frac{\delta^2}{4h^2} \right)$

See text for explanation of parameters and variables.

Table 5. Summary Statistics for Table 6 & 7 Variables)1991)

	*1988 (*only)
GIV	.0442 <u>(.2448)</u>
ATT	..3361 (.4234)
INC	20866.83 (14575.85)
TB	.524 (.4997)
DB	.2876 (.4529)
NB	.1885 (.3913)
EXP	.2658 (.442)
EXA	.1688 (.3748)
PEN	.061 (.2395)
COV	.4074 (.4916)
NOC	.0969 (.2961)
TBEXP	.1536 (.3608)
TBEXA	.0545 (.2271)
TBPEN	.0501 (.2183)
TBCOV	.2527 (.4348)
TBNOC	.0131 (.1136)
DBEXP	.0806 (.2724)
DBPEN	.0076 (.087)
DBCov	.0871
DBNOC	(.282) .0425

GSS data, 1988, 1991, see text and data appendix.

Table 6. Estimates: Full Model (1991)

Estimator	OLS coefficients (std error)	TOBIT marginal coefficients (std error)
Dependent var	ATTEND	ATTEND
Specification	FULL	FULL
TB	23.87*	31.394***
	(12.4)	(12.114)
	OLS (1991)	TOBIT (1991)
DB	1.879	4.995
	(5.69)	(9.012)
EXP	13.22*	31.474***
	(7.22)	(9.104)
EXA	29.34***	47.599***
	(8.10)	(8.424)
PEN	34.62	55.330***
	(24.6)	(20.540)
COV	39.77***	52.128***
	(6.90)	(7.835)
TBEXP	4.650	-8.992
	(14.4)	(13.959)
TBEXA	-32.62**	-29.902**
	(15.3)	(14.077)
TBPEN	-16.77	-23.219
	(28.2)	(23.471)
TBCOV	-18.75	-25.438
	(14.0)	(13.044)
DBEXP	2.406	-4.203
	(9.55)	(11.723)
DBEXA	-27.01***	-21.466
	(9.67)	(11.290)
DBPEN	-28.78	-25.401
	(28.3)	(25.295)
DBCov	-33.00***	-26.806**
	(8.85)	(10.718)
nobbs	918	918
R2/Log L	0.15	-4263.12
** p<.05	***p<.01	

Table 7. Canonical Correlation (1988). Restricted specification

Dep/indep variables	
ATT	.0237*** (.019)
GIV	-.0469 (.032)
TB	1.060* (.60)
DB	.098 (0.54)
EXP	1.10 (.99)
EXA	.0836 (.79)
COV	1.415 (1.26)
TBEXP	.809 1.10)
TBEXA	.748 (0.89)
TBCOV	1.305 1.34)
DBEXA	0.748 (0.89)
nobs	891

*

Dependent variables are % time and % income devoted to religious groups See text for Description of data and variables.(*p<.10 **p<.05 *** p<.01)

Data Appendix

Table A1. Variable Definitions.

<u>Variable</u>	<u>Definition</u>
GIV	Contributions as percentage of income in 1990 dollars
ATT	Approximate percentage of yearly attendance measured in weeks
INC	Income in 1990 dollars
TB	Respondents who know God exists
DBTBEL	Respondents who have doubts or believe sometimes or believe in a higher power but not necessarily a personal God
NB	Respondents who either don't believe in God or think there is no way to find out
EXP	Dummy variable takes a value of 1 if respondent was Catholic
EXA	Dummy variable takes a value of 1 if respondent identified with an <i>ex ante</i> contract and did not believe in the devil (1991 sample)
EXPEN	Dummy variable takes a value of 1 if respondent identified with an <i>ex ante</i> contract and believed in the devil (1991 sample)
COV	Dummy variable takes a value of 1 if respondent was a Baptist, Missouri Synod Lutheran, other or non-denominational Protestant
NOC	Respondents either answered none or other for religious affiliation
TBEXP	Trusting believers who identify with <i>ex post</i> contracts
TBEXA	Trusting believers who identify with <i>ex ante</i> contracts (1988 and 1991 samples)
TBXA	Trusting believers who identify with <i>ex ante</i> contracts without a penalty (1991 sample)
TBPEN	Trusting believers who identify with <i>ex ante</i> contracts with a penalty (1991 sample)
TBCOV	Trusting believers who identify with covenants
DBEXP	Doubting believers who identify with <i>ex post</i> contracts
DBEXA	Doubting believers who identify with <i>ex ante</i> contracts (1988 and 1991 samples)
DBPEN	DB who identify with <i>ex ante</i> contracts with a penalty(1991)
DBCov	Doubting believers who identify with covenants.
NBEXP	Nonbelievers who enter into an <i>ex post</i> contract

Table A1 continued: Variable definitions

Variable	Definition
NOC	not identified with any contract
NBPEN	NB respondents identified with EXA contracts and who believe in the devil

Note: see text and references for explanation and source of data.

Table A.2. Church-sect contract typology

CONTRACT	RELIGION/DENOMINATION
	Observations in Parentheses for years 1988 (N=891) and 1991 (N=1492) respectively; EXPEN for year 1991 only
COV	American Baptist(22,42) American Baptist Church in USA(9,12) National Baptist Convention of America(1,9) National Baptist Convention USA(3,2) Southern Baptist(102,127) Other Baptist(21,23) Baptist—Don't know which (36,87) Missouri Synod Lutheran(12, 28) Wisconsin Evangelical Lutheran Synod(3,2)
EXANT	African Methodist Episcopal (4,12), African Methodist Episcopal Zion (1,4) United Methodist (61,105) Other Methodist (3,1) Methodist—Don't know which (11,11) American Lutheran (10, 32) Lutheran Church in America (7,11) Other Lutheran (3, 5) Evangelical Lutheran (4,12) Lutheran—Don't know which (10,13) Presbyterian Church in US (15,12) Presbyterian—Don't know which (12,18) Episcopal (16,32) No denomination (50,52)
EXPST	Catholic (239,384) Other (117,255)
EXPEN	Devil (545)

Note: see text and references for explanation and source of data.

Biblical Appendix

Introduction

The model in the accompanying paper relies on biblical archetypes for religious beliefs and contracts in Judeo-Christian theology. The model also implicitly suggests the evolution of four contractual archetypes and the possibility of three types of believers or nonbelievers, that is, doubting and trusting believers and nonbelievers. This appendix is intended solely to provide illustrative examples in a broader biblical context for the model, hence, is neither strictly economics, nor theology, and not intended for publication.

The broadest and most comprehensive biblical illustration of the progression of belief archetypes used in the model begins with God's ex post contract with Adam and Eve and Old Testament humanity, continues with God's ex ante contract with New Testament humanity and concludes with God's covenant at the 'end of history.'

Old Testament

Two initial Old Testament examples involve gifts and consumption of 'milk and honey' from the Promised Land, but do not involve transforming faith, but we then turn to the 'Exodus'. This biblical cohort of humanity consists of the Israelites who passed through the Red Sea and their children who entered into the Promised Land under Joshua, followed by the experience of the Israelites from the time of Joshua to the time of David. To round out our examples of belief archetypes, we then consider the biblical cohort of humanity through history from Adam and Eve to the New Testament incarnation and the time of the apostles. Briefly put, nonbelievers and doubting believers are identified with Adam and Eve, and believers with transforming faith are identified with trusting believers associated with either New or Old Testament covenants.

The Exodus

background

The story of Israel's exodus out of Egypt and the ex post contract God makes with Israel on Mt. Sinai is one of the greatest stories of freedom in the bible. It is the major event in the Torah. The significance and scope of the Exodus for the people of Israel is well summed up in Moses' speech to Israel east of the Jordan River as they prepare to take possession of the Promised Land.

Ask now about the former days, long before your time, from the day God created man on the earth; ask from one end of the heaven to the other. Has anything as great as this ever happened, or has anything like it ever been heard of? Have any other people heard the voice of God speaking out of fire, as you have, and lived? Has any god ever tried to take for himself one nation out of another nation, by testing, by miraculous signs and wonders, by war, by a mighty hand and an outstretched arm, or by great and awesome deeds, like all the things the Lord your God did for you in Egypt before your very eyes?(Deut.4:32-34)

The story properly begins when God reveals himself orally to Moses as the Lord (Hebrew, Yahweh) and chooses Moses to lead Israel out of Egypt as recorded in the book of Exodus. At the same time, the written use of the term Lord begins in the Genesis account of Adam and Eve. This suggests that the story of Adam and Eve provides important background for understanding the story of the exodus. In particular, the narrative in Genesis suggests that one of the consequences of humanity's doubt in God's promises is the establishment of the institution of slavery. The presence of slavery is first described in the story of Joseph in the book of Genesis when Joseph's brothers sell him into slavery and then expanded in the book of Exodus when Pharaoh, king of Egypt, takes the nation of Israel as slaves.

In the beginning of the book of Exodus, God reveals himself to Moses in a bush which is on fire but is not burnt up. When Moses approaches the unusual bush, God tells him that the

place where he is standing is holy ground and gives Moses an ex post contract in which he is to command Pharaoh, “let my people go.”(Ex 3:10,18) Moses does not want to accept the contract, arguing that he does not possess the attributes to accomplish this task and asks God to send someone else to do it. God overrules Moses, endows him with attributes sufficient to lead Israel out of Egypt, and appoints his brother Aaron to help. God then makes an ex post contract with Israel in which he tells them he is concerned about them and promises freedom from slavery and consumption of ‘milk and honey’ from the Promised Land in exchange for following Moses, their deliverer.

Instead of listening to Moses’ command, however, Pharaoh makes life harder for Israel by requiring them to increase production of bricks, even without straw, and then whips and beats them for failure to meet mandated production levels. Israel responds by doubting God’s promise of future freedom and the milk and honey of the Promised Land.

God’s ex ante contract with Israel

Perhaps in response to the problem of doubt in the ex post contract, God makes an ex ante contract with Israel in which Israel experiences a series of miracles (an element of V?), which God performs against Egypt conditional upon a promise to keep the Ten Commandments. These miracles take the form of plagues, beginning with afflictions against the land of Egypt and culminating in the miracle of the parting of the Red Sea. In this miracle, God parts the waters, brings Israel safely through, and then turns back the waters upon Pharaoh and Egypt, drowning the Egyptians in the sea and eliminating both the slavery of Egypt and the doubt of Israel. Doubting believers, who remain in doubt through all the plagues, fearful of what Egypt might do to them, consume this final ‘Red Sea’ miracle, and are converted. In recognition of their conversion, Moses leads all the believers in a song. The first two lines are:

I will sing unto the Lord, for he has triumphed gloriously: horse and rider thrown into the sea.

The Lord is my strength and my song, he has become my salvation: he is my God, and my father's God, and I will exalt him.(Ex.15:1-3)

An ex ante contract with a penalty

After the miracle of the Red Sea, Israel begins its journey to the 'Promised Land'. During this journey, God appears to Moses on Mt. Sinai. Moses stays on Mt. Sinai with God for forty days and forty nights,' and receives both the Ten Commandments and provisions for temporary violations of the Ten Commandments. However, instead of keeping the Ten Commandments, Israel violates the Ten Commandments, frequently renegeing and complaining. On one occasion, Moses chooses twelve men to spy out the land and bring back some of its agricultural produce. The men return with a cluster of grapes and a positive report that the land is flowing with milk and honey. They also report that the people of the land are strong, tall, and live in fortified cities. Instead of responding in compliance with the Ten Commandments, Israel complains and quarrels against Moses for leading them into 'certain' death. As a consequence, God penalizes Israel by refusing to allow them to enter the Promised Land. Even Moses is not allowed to enter in spite of his special friendship with God, his meekness, and his example. The consequence of this penalty is a renewed commitment on the part of the remaining Israelites to keep the Ten Commandments under Moses and Joshua and an increase in good works.

God's covenant with Joshua and Israel

After the death of Moses, God renews his commitment to Israel by entering into an ex post contract and a covenant with Israel. God's contract with Israel requires that Israel take complete possession of the Promised Land, fighting against the inhabitants of the land. God's covenant with Israel gives them spiritual calm in the land upon condition of transforming faith.

In order to aid Israel in their contractual quest, God promises to fight for them. If Israel does what God says, they will enjoy consumption of ‘milk and honey’ from the entire land. To carry out his promise, God causes the walls of the city of Jericho fall inward, allowing Israel to storm the city and take it. God then continues to give Israel the assistance needed to take possession of the Promised Land. Beginning with the city immediately west of the Jordan river, Jericho, Israel conquers “all the land, the hills, and all the south country, and all the land of Goshen, and the valley, and the plain, and the mountains and valleys of Israel.” God then provides rest to Israel from all its enemies and spiritual peace for Israelites who possess transforming faith and know that “not one of God’s good promises will fail.” Thus, through this contract, Israel takes all the land God had promised them and has respite from war.

To ensure not only physical safety, but also spiritual peace, God enters into a covenant with Israel in which spiritual peace is granted to Israel conditional on transforming faith. The spiritual peace is reassurance for worry that God’s promises will fail and possession of the land will only be temporary. Israelites who enter into this spiritual peace know that “not one of God’s good promises will fail” and look forward to continuing peace under Joshua’s leadership. Thus, through the covenant and in the context of our model, Israel gains additional utility afforded by transforming faith in God’s protection and care.

From Joshua to David

God’s ex post contract with Israel after Joshua

The story of God’s relationship with Israel between the time of Joshua and the time of David primarily revolves around Israel’s attempts to take complete possession of the land. After Joshua dies, possession of the land is not automatic. Israel’s neighbors have contracts with their own gods and are not friendly toward Israel; the particular ex

post contract God makes with Israel promises them continuing additional consumption on the condition that they remain faithful to their divine contract and don't enter into the divine contracts with the surrounding nations. Some of the twelve tribes of Israel keep this commitment, but other tribes fail to keep this contract, because they doubt God's promise to Israel of additional consumption and prefer the contracts of the nations around them. The situation grows increasingly worse and virtually all the Israelites doubt God's promises and enter into the divine contracts of the nations around them.

God's ex ante covenant with Israel during the time of Judges

God appears to address the problem of doubting belief by offering a series of ex ante contracts to Israel over the course of roughly 350 years, during which, God provides additional 'utility' (in our terminology) through the guidance of a judge or leader who enables Israel to succeed against its enemies. The provision of greater utility through the role of judges enables successive generations of Israelites to convert from doubting to trusting faith, as they witness the additional utility ('blessings') God provides. The Book of judges describes the triumphs of Israel under these judges. Samson is perhaps the most famous judge because he is given super strength by God, which enables him to defeat the enemies of Israel and to provide additional utility for Israel; the story of Samson and Delilah is a literary classic in which Delilah discovers that the secret of Samson's strength is his long hair and then arranges for his hair to be cut, making him like any other man. Not to be frustrated, Samson recovers his strength as his hair grows back and brings down a mighty wall on top of the Philistines and himself. Samson's fate might be interpreted in our context as a signal that ex ante contracts without a penalty are not a satisfactory solution to the problem of renegeing.

An ex ante contract with penalty

The difficulty of the ex ante contracts Israel enters into with God is that the additional utility comes only when the judge is alive. After the death of the judge, Israel always reneges. To address this problem, God penalizes Israel by reducing their utility and subjecting them to slavery. The penalty leads Israel to seek God and increase their good works. The pattern of ex ante consumption during the life of the judge and then renegeing is so frequent that the author of the book of judges describes it as a pattern of behavior for Israel over the entire period. The pattern can be summarized as:

- (1) A generation of Israelites arises who don't believe God's promises
- (2) Israel enters into contracts with the neighbors and their gods
- (3) God penalizes Israel, subjecting them to slavery
- (4) Israel accepts God's contract and rejects the neighbors contracts
- (5) God provides a judge for Israel who brings additional utility
- (6) The judge dies and the next generation repeats the cycle

Eventually, during the time of Samuel, Israel becomes tired of judges and requests a divine contract that resembles the nations around them. This means appointing a king to lead them in battle. God is not pleased with this request but abides by it and provides a king for Israel, determining to enter into a covenant and a contract with the king and with Israel.

A contract and a covenant with Israel and King David

The king that God appoints to accomplish this is named David, a small shepherd boy from the smallest tribe of Israel, who also possesses transforming faith. God chooses David to demonstrate that Israel is best off relying not on a big strong leader, but on transforming faith. David's legendary fight with and victory over Goliath with merely a slingshot and some stones demonstrate this truth. After his victory, David defeats various nations who have been oppressing Israel and establishes centralized worship in Jerusalem extending Israel's possession of the land to the greatest limits in its history. David and his fighters possess transforming faith and accomplish their feats as they carry out God's contract with them and with Israel. The

additional utility received by believers with transforming faith comes in the form of a promise; God promises to give all believers with transforming faith a share in an everlasting dynasty made with David and his descendants. Evidence of this is seen in David's response to God's promise:

How great you are, O Sovereign Lord! There is no one like you, and there is no God but you, as we have heard with our own ears. And who is like your people Israel—the one nation on earth that God went out to redeem as a people for himself, and to make a name for himself, and to perform great and awesome wonders by driving out nations and their gods from before your people, whom you redeemed from Egypt? You have established your people Israel as your very own forever, and you, O Lord, have become their God. And now, Lord God, keep forever the promise you have made concerning your servant and his house. Do as you promised, so that your name will be great forever.

Evidence of additional utility for all believers with transforming faith is also revealed in the words of Ethan the Ezrahite in Psalm 89:

I will sing of the Lord's great love forever; with my mouth I will make known your faithfulness through all generations. I will declare that your love stands firm forever, that you established your faithfulness in heaven itself. You said, "I have made a covenant with my chosen one, I have sworn to David my servant, I will establish your line forever and make your throne firm through all generations.(Psalm 89:1-4)

New Testament

Jesus, the apostles, and humanity

One of the fundamental theological tensions in the New Testament documents is the question of when transforming faith actually begins and when renegeing ends. On the one hand, transforming faith is not acquired until believers reach perfection in the afterlife because it is only in the afterlife when renegeing ends. On the other hand, renegeing ends with Pentecost, when the apostles receive the gift of transforming faith and experience the spiritual increase to utility associated with this gift. From that point onward, the apostles, though they are imperfect, satisfactorily do the good works Jesus requires and do not deny their knowledge of Jesus, as they

did during the time of his death. Similarly, humans who truly believe the apostles' message also embody the good work It is believed Jesus expects of true believers.

This example describes the sequence of arrangements under the assumption that believers acquire transforming faith before the afterlife. In particular, the apostles experience a spiritual gift after the event of Pentecost through participation in the 'Lord's supper.'

The stories of Jesus in the Gospels indicate that Jesus chooses a particular group of twelve followers requiring them to leave their homes, their possessions, their families, and their neighborhoods to follow him in a larger mission throughout the region of Israel. In addition to these twelve followers, called apostles, a group of women support Jesus out of their means and follow him as well. The ex post contract Jesus gives to his followers requires them to identify them with him and to do to others what they would have others do to them. The most difficult test of this contract consists of identifying with him during his humiliation when he dies on the cross under the condemnation of the Roman Government and the Jewish Sanhedrin. Completion of these requirements is rewarded with consumption of a special meal.

Despite the willingness and commitment of Jesus' apostles and his followers to identify with him, the Gospels also indicate that his followers expect Jesus to provide an immediate reward through the establishment of a city to fulfill Old Testament promises of a 'land.' Jesus' followers do not understand that Jesus promises a spiritual reward for trusting belief. The result of this misunderstanding is that his followers do not identify with him during the period between his public humiliation and his re-appearance from death and do not do for him what he did for them. Instead, the Gospels indicate that his followers doubt his promise.

The Passover

Jesus nevertheless makes an ex ante contract with the apostles in which they accept his miracles (an element of V?) and participate in the Passover before his death. The Passover is described in three different gospels. The account from the gospel of Luke follows:

He replied, "As you enter the city, a man carrying a jar of water will meet you. Follow him to the house that he enters, and say to the owner of the house, 'The teacher asks: Where is the guest room, where I may eat the Passover with my disciples?' He will show you a large upper room, all furnished. Make preparations there. They left and found things just as Jesus had told them. So they prepared the Passover.

When the hour came, Jesus and his apostles reclined at the table. And he said to them, "I have eagerly desired to eat this Passover with you before I suffer. For I tell you, I will not eat it again until it finds fulfillment in the kingdom of God." After taking the cup, he gave thanks and said, "Take this and divide it among you. For I tell you I will not drink again of the fruit of the vine until the kingdom of God comes." And he took bread, gave thanks and broke it, and gave it to them, saying, "This is my body given for you; do this in remembrance of me." In the same way, after the supper he took the cup, saying, "This cup is the new covenant in my blood, which is poured out for you.(Luke 22:10-20).

There are features in this account which are helpful for describing the ex ante contract. Even though the apostles do not yet have transforming faith when Jesus says these words, Jesus looks forward to the time when they will receive the Passover as a covenant meal, termed the "Lord's Supper", when they possess transforming faith. Thus, In addition, this ex ante contract looks forward to the day when the apostles have transforming faith.

In spite of the Passover meal, the apostles still do not possess the transforming faith necessary to end reneging on promises to God. As a penalty, God subjects the apostles to a

penalty of remorse and spiritual deprivation between the period of time between Jesus' death and his re-appearance from death. After Jesus reappears from death, he speaks with the apostles for a period of forty days. During this time, he enters into a contract with the apostles and other believers in which he requires them to speak with others about his death, re-appearance from death, and entrance into an infinite afterlife with God. He also tells the believers to gather in Jerusalem to await the event of Pentecost, at which time everyone will obtain transforming faith. By gathering in Jerusalem, believers renew their good works after the penalty.

During Pentecost, the apostles obtain transforming faith. After this event, believers obtain transforming faith through the apostles' activity. In particular, the apostles begin to administer the covenant of the 'Lord's Supper' and believers experience assurance and pleasure as they take the elements of the bread and the wine which serve as both a reminder of forgiveness for renegeing and a spiritual "blessing both in the present and in the future", something available only with transforming faith during either the Old Testament or New Testament periods.

an ex post contract: the story of Adam and Eve

The story of Adam is described in the first three chapters of the book of Genesis. In chapter one, God creates Adam and Eve and gives them similar attributes to his own. In particular, God gives Adam and Eve the attributes of goodness and power. Goodness expresses itself in the performance of good works and power expresses itself in productive agricultural activity on the earth. In addition to these attributes, Adam and Eve also possess free-will. This means tAdam and Eve may pursue their own interests instead of God's interests and may reduce time spent in good works from the divine ideal if given the right incentive to do so.

In *Exodus*, Chapter two, God creates a garden in Eden as a place for Adam and Eve to live. In the garden of Eden, God places trees and plants that are pleasing to the eye and good for

food so that Adam has an incentive to eat from the trees and plants. Of these trees and plants, God places one tree, the tree of life, which potentially yields earthly consumption for an infinite period of time. God also places a tree, the tree of the knowledge of good and evil, in the garden. God then gives Adam and Eve a specific ex post contract (with a penalty) in which they are free to eat from any tree in the garden of Eden, but must not eat from the tree of the knowledge of good and evil. God promises to give Adam and Eve liberty to enjoy fruit from the tree and to live for eternity, but threatens them with death if he does not.

In chapter three, the writer describes a third party, the serpent, who suggests to Adam and Eve an alternative (disingenuous) contract in which they may gain knowledge if they eat from the tree of the knowledge of good and evil. This offer leads to doubt concerning God's promise in withholding this source of consumption. Moreover, since the tree of the knowledge of good and evil is pleasing to the eye and attractive, Adam and Eve eat from the tree and reduce their input into the good work of tending God's gift of Eden

The ex post contract: the story of Old Testament humanity

The scriptures indicate that Adam and Eve's doubt of God's promise and reduced good works are conveyed to all humanity. While the specific form of the contractual prohibition, don't eat from the tree of the knowledge of good and evil, is unique to Adam and Eve, the contract is 'reestablished' for future generations of humans through the Ten Commandments. Just as God required perfect obedience from Adam and Eve through the prohibition as a condition for heavenly life, God requires perfect obedience to the Ten Commandments as a condition for a heavenly life. Just as Adam and Eve reduce input into good works by eating from the tree of the knowledge of good and evil and forfeit the right to eat from the tree of life, so Old Testament

humanity reduce good works by violating the Ten Commandments and forfeit their right to consume the 'milk and honey' from the Promised Land. The historical books of Kings and Chronicles and the Major and Minor Prophets describe this forfeiture as exile; Even people who are described in exemplary terms in the Old Testament and are unlike Israel violate the Ten Commandments; Noah plants a vineyard and gets drunk, Abraham lies and sleeps with his wife's handmaiden, Moses gets angry at Israel and at God, and David commits adultery. The implication of Adam and Eve's doubt is significant: Trusting believers are the exception in Old Testament humanity; with the prominent exception of Abraham and the prophets, Old Testament humanity consists primarily of doubting believers and nonbelievers. This condition sets the stage for God's offer of an ex ante contract with humanity.

An ex ante contract for New Testament humanity: stories from the Gospels

To reach doubting believers, God offers humanity an ex ante contract in which God promises salvation conditional on doing good works, which Jesus assigns. The good works Jesus assigns may be summed up in the golden rule: do unto others what you would have them do to you. Consumption of a meal is figurative but nonetheless real according to the gospel writers. For example, Jesus himself speaks of eating of the fruit of the vine in God's heavenly kingdom.(Mt.26:29; Mk.14:25; Lk.22:18)

Religious consumption of meals is reported in two ways in the gospels. It occurs when humans 'taste and see' Jesus' miraculous activity. For example, It also takes place when the apostles see Jesus change water into wine, when they watch him feed 5,000 people with only a few pieces of fish and a few loaves of bread, when a woman who has been bleeding for twelve years is suddenly healed, when a man born blind sees, when a leper is cured of his skin disease, when Thomas touches Jesus, and when the apostles eat fish with Jesus after his appearance from

death. More significantly, religious consumption of a meal occurs in the context of the Passover, as mentioned above. In contrast to the Passover of Exodus, the previous example, the Passover meal here is public.

The result of consumption of the Passover is the conversion of doubting believers and the creation of a community composed of all humans who enjoy consumption of the Lord's Supper. This conversion, however, does not eliminate renegeing. Believers may still renege because they do not possess transforming faith. As an example, the gospel of Matthew describes Jesus' prediction of the apostles' renegeing in the following way: After the Last Supper, Jesus says, "this very night you will all fall away on account of me." Matthew later records Peter's denial of Jesus in fulfillment of this prediction. This denial of Jesus and falling away of believers constitutes a renegeing of the apostles' promise to follow Jesus, and a reduction in their good works.

The Covenant

As a result of his blinding, Saul's name and title are changed to the apostle Paul and he commits himself to establishing communities of faith throughout the Mediterranean region. Paul's goal is ultimately to establish a community of faith in Rome, a goal which Paul reaches according to the book of Acts.

A somewhat humorous example of renegeing and asymmetric information occurs with regard to two believers on a road going to a village called Emmaus, about seven miles from Jerusalem. On this road, Jesus appears after his death walking with a man named Cleopas and a friend. Jesus asks both men what they are discussing and they answer with downcast faces, "Are you only a visitor to Jerusalem and do not know the things that have happened there in these days?" The men then proceed to inform Jesus about himself without recognizing him. The time they spend doing this reduces their own good works. After some time, Jesus penalizes them for their ignorance by telling them how foolish and slow of heart they are for ignoring the predictions of the prophets concerning his suffering and entrance into heaven. Still, they do not recognize him. Finally, Jesus eats a meal with them and they recognize him after he breaks bread and gives thanks to God for it. This recognition leads to an increase in good works, as they

speaking to others of their experience together. These examples show that while penalties can eliminate renegeing, there is still a possibility for Pareto improvement via covenants