Does Religion Make Cents:

An Examination of Religiosity, Social Capital, and Economic Welfare

by

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I.   Introduction

At the turn of the century, religion has displayed an increasingly persistent role in the developed and developing world. Nearly 80 percent of the total world population adheres to a mainline religious belief system. In the United States, a 2001 survey reported that 76.5 to 78.5 percent of American adult citizens identify themselves as Christian. Non-Christian religions (Judaism, Buddhism, Islam, and Hinduism) make up an additional 5.5 percent.   Despite its prevalence, economic literature is only beginning to grasp the empirical effects of religion. In this paper I examine the relationship between religious adherence and economic performance. Building on past research, I model the concept of social capital. I posit that religious participation fosters religious convictions which encourage the formation of social capital. Religious involvement entices community networks outside the formal economic sector. Consequently, religious participation has both positive and negative effects on economic activity.   Increased religious involvement demands time and resources thus dampening economic potential. On the other hand, the subsequent formation of social capital enhances cooperation, coordination, and reciprocity which consequently fosters increased welfare from interactive trade.   I develop a simple theoretical model which highlights this trade-off. Constructing different cases, I examine how changes in religious time affect expected welfare. Next, I turn to the data and discover a dominant negative relationship between religiosity and economic performance.   I find that, cumulatively, increased religious adherence decreases per capita income; in effect crowding out productive activity.

Section II is an overview of the literature. I will first examine the concept of social capital and the role of religion in social capital formation.   I will then discuss recent empirical

studies assessing the interaction between religion and economic performance. Section III will build a basic game theoretic model highlighting the trade-off between religious participation and productive activity. Section IV will examine the empirical relationship between religious adherence, per capita income, population mobility, and crime rates in nearly 3000 United States counties. Finally Section V will summarize the findings and discuss potential extensions of the theoretical and empirical model.

II. Overview of the Literature

Religion as Social Capital

Whereas physical capital refers to physical objects and human capital refers to individuals, "social capital refers to connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them" (Putnam, 1995). Originally coined in 1916 by L.J. Halifan, the term highlights the importance of community, networks, and social intercourse. Putnam, Leonardi and Nanetti define social capital as "the social structure which facilitates coordination and cooperation" (1993). Even more loosely Coleman (1990) defines social capital as merely some aspect of social structure "making possible the achievement of certain ends that would not be attainable in its absence".

At an individual level social capital is the mutual benefit derived by interconnected agents. Social networks enhance information exchange, reduce contracting costs, and promote collective goals. At an aggregate level social capital refers to regional social infrastructure. Civic engagement and coordinated interests enhance the effectiveness of local governments and economic markets. (Beugelsdijk, Smulders; 2004)

In "Bowling Alone; Americas Declining Social Capital" (1995) Robert Putnam discusses the deterioration of social structure in the United Sates during the past century. He notes that traditional, civic, social and fraternal organizations have experienced a rapid decrease in membership. Bowling leagues, for example, have been on the decline, while the number of individuals bowling has increased. By almost every measure Americans have become more and more detached from civil society. Putnam argues that this trend has negative long term economic and political consequences. Civic disengagement and emerging individualistic attitudes have the potential to undermine the foundation of a healthy, vibrant economy. "The very fabric of our connections with each other, has plummeted, impoverishing our lives and communities" (Putnam, 1995)

Similar to both human and physical capital, social capital is a critical ingredient towards enhanced economic prosperity. An interconnected social infrastructure facilitates cooperation, trust, and reciprocity, and fosters a nurturing, cohesive economic environment. At a micro level, social capital enhances information quality, encourages compliance, and reduces monitoring costs. Routledge and Amsberg (2002) posit that intercommunity networks encourage cooperative, friendly trade which reduces contracting, measuring, and enforcing costs. At an aggregate level Putnam (1995) argues that "features of social organization such as trusts, norms and networks can improve the efficiency of a society by co-ordinated actions." Boix and Posner (1998) posit that social capital decreases the probability of rent-seeking and opportunistic behaviour, wasting fewer resources, and increasing the potential for productive investment. Furthermore, a healthy social infrastructure facilitates the articulation of citizen demands and reduces transaction costs of citizen-government relations. In a study of modern

Italy, Putnam (1993) indeed finds that measures of social capital are positively correlated with effective governance and higher per capita GDP. Similarly, Knack and Keefer (1997) show that measures of social trust demonstrate a statistically significant positive relationship with growth for OECD and middle income developing countries.

Despite being the largest voluntary association in the United States, minimal scholarly attention has been given to the role of religion in social capital formation. In fact, Putnam himself argues that "faith communities in which people worship together are arguably the single most important repositories of social capital" (1995). "Houses of worship build and sustain more social capital – and social capital of more varied forms - than any other type of institution in America" (Magill, 2001). Magill estimates that nearly half of America's stock of social capital is religiously affiliated, whether membership, volunteering or philanthropy.

Within congregations, religion promotes a sense of community and fosters bonding and bridging social capital. Regular attendance encourages networks, fellowship, and support groups. In this way, faith communities provide a "safety net" for members. For example, church members may experience emotional and financial insurance from setbacks such as job loss or family crisis.

Religion, however, not only builds social capital amidst church walls, but fosters social capital beyond church doors. Faith groups provide services and resources such as physical care, social support, and social networks within the local community. Wood (1997) recognizes that while secular civic associations have experienced declining influence, church based organizational efforts have risen to success in the urban setting. For example, within rapidly

deteriorating American inner-city neighbourhoods religious institutions are among the few still trusted (Wood, 1997).

Furthermore, religious beliefs and values may provide a moral foundation for increased social engagement. Mainline religious doctrines promote selflessness, compassion, and empathy. Adherence to these principles may influence the way in which believers relate to each other in the outside community. Religious behaviour has the potential to reshape individual incentives and entice volunteer activities and charitable practices (Magill, 2001).

In addition, Laurence Iannoconne (1984) introduces the concept of religious capital. Religious capital is similar to human capital in that it is accumulated through investment, enhances productivity, and depreciates over time. Examples include religious knowledge, familiarization with rituals, and fellowship with worshipers. Time investment enhances these qualities and increases the collective satisfaction of the community. Importantly, Iannaccone highlights the positive externalities associated with religious involvement. In the congregational setting, adherents incur positive benefits from one another. For example, "an active member who attends regularly, sings wholeheartedly, and greets others enthusiastically increases the utility of others members" (Iannaccone, 1992).

Despite declining church attendance in the developed world, religion remains infused in global politics, media and culture. The social capital faith communities build and sustain have undeniable linkages to economic activity. Next, I will review the literature discussing the theoretical and empirical relationship between religiosity and economic performance.

Empirics of Religion and Economic Performance

A century ago in his seminal work, "The Protestant Ethic and the Spirit of Capitalism", Max Weber argued that Protestantism was a distinguishable factor in the economic success of Europe. He reasoned that protestant religious values such as diligence, discipline, and thrift promoted increased savings, capital accumulation, and entrepreneurial activity, all of which fostered increased economic prosperity (Weber, 1930).

Recent literature on religion and economic performance has revisited Weber's hypothesis. Most notably, Barro and McCleary (2003) argue that the affect of religion is twofold.   Formal religious participation demands time and resources, thus diminishing economic potential. Yet religious participation produces religious beliefs which foster character traits such work ethic, honesty and thrift. These qualities presumably encourage productivity and thus indirectly enhance economic performance.   Therefore directly, religious involvement has a potential negative effect on growth; while indirectly, the ensuing religious convictions entice growth.

Using cross country panel data, Barro and McCleary test the empirical relationship between religion and economic growth.   Employing the presence of state religion, the composition of religious adherence, and an indicator of religious pluralism as instrumental variables they assess international survey data for 59 countries. The authors find that religious beliefs measured by belief in heaven and hell exhibits a positive relationship with economic growth, while religious participation measured by church attendance demonstrates a negative effect.   In this way "growth depends on the extent of believing relative to belonging." Countries with high levels of beliefs and low levels of church attendance experience increased

growth, whereas countries with lesser beliefs and high church attendance experience decreased growth.

Similarly, Robin Grier (1997) tests the linkage between religion and economic growth by analyzing 63 countries with a history of colonization.   She questions whether religion explains the underdevelopment of Spanish ex-colonies in comparison to its British counterparts. Grier finds a positive correlation between Protestantism and economic growth. A one standard deviation increase in Protestantism growth is associated with a significant 0.49 percentage increase in average growth.   However, Grier concludes that controlling for growth rate of Protestantism does not eliminate the gap between British, French, and Spanish colonial development. Thus religion is not the sole determinant of growth. Rather, Grier concludes, it is one many critical factors which influence economic development.

Glahe and Vorhies (1989) offer a different perspective. They theorize that Judeo-Christian values promote laissez faire capitalism which in turn encourages the generation of wealth. The first of these causal relationships is more contentious than the later. It is widely accepted that laissez fair capitalism is the best vehicle towards economic prosperity. However the notion that Judeo Christian principles are consistent with laissez fair capitalism is less straightforward.   L. Von Mises (1981) is critical of the connection between Christianity and political liberty.   He argues that "a living Christian cannot, it seems, live side by side with capitalism."   However, others such as Novak (1986) associate Christianity inherently with classical liberalism. Novak states that "the heart of Judaism and Christianity – their convictions about freedom and responsibility – is liberal."

Glahe and Vorhies test the relationship between religiosity, political liberties, and economic development. They construct an index of four economic development indicators; per capita gross national product, average life expectancy, adult literacy rate, and infant survival rate. Using cross-national data, they find that religion and liberty have a positive influence on economic development. Nations with Judeo-Christian values are more likely to have political democracies and consequently improved development indicators.

Heath, Waters, and Watson (1995) conduct a similar study. They too examine the affect of religion, transmitted through private and public institutions, on economic prosperity. Rather than a cross national study, they turn to various Judeo-Christian populations in the United States. Their empirical findings suggest that religion has a significant negative effect on per capita income. Moreover, fundamentalism exerts the strongest influence in both magnitude and significance. The authors conclude that fundamentalist movements in the United States promote a less liberal economic environment and thus diminish economic performance.

This empirical analysis will expand on the existing literature. I hypothesize that religious involvement fosters social capital yet crowds out time in the productive sector. In the next section I will construct a game theoretic model which captures these two effects. In section IV I will analyze United States county data and draw linkages between religiosity and economic performance.

III.   Basic Theoretical Model

The theoretical model envisions a community in which individuals engage in productive, economic transactions. Each transaction involves two individuals who may act aggressively or

cooperatively.   The payoffs incurred by both individuals depend on the actions chosen.

Cooperative trading is efficient as fewer resources are utilized for contracting, measuring and

enforcing. However, cooperation by one individual may be exploited by the other.   Therefore,

aggressive trading may be viewed as both parties attempting to exploit one another.   The

result is less efficient trade as resources are consumed for contracting, measuring and

enforcing.

Consider a community with set S of individuals. In the absence of religion, individuals

engage in a basic interaction trading game, G.   Individuals are drawn randomly from set S and

matched against one another to play G.

The strategies A and C denote aggressive and cooperative behaviour. The payoffs

reflect a prisoner dilemma game. Though cooperation (C,C) yields the highest payoffs, there is

an individual incentive to act aggressive.   Thus, aggression (A,A) is the Nash Equilibrium

despite being pareto inferior to cooperation.

The interpretation of the payoffs is as follows. Cooperative, friendly trade is efficient

since fewer resources are wasted on contracting, measuring, and enforcing.   Cooperation is

thus welfare dominant and associated with coordination, trust, and reciprocity. Routledge and

Von Amsberg (2002) define this type cooperative, friendly equilibrium as the "existence of

social capital." Yet, cooperative trade may be exploited by aggressive interaction. Both players have an incentive to deviate from the cooperative outcome. For instance, cut-throat business strategy is self advantageous against a cooperative player. Given the payoffs in game G, aggressive action is dominant strategy. Consequently, rather than cooperation (C, C), aggression (A, A) is the Nash Equilibrium. Because more resources are consumed for contracting and enforcing this equilibrium is pareto inferior. Therefore, in the absence of religion, individuals play the basic interaction game G aggressively, thereby diminishing potential welfare and dissuading social capital formation.

This basic interactive trading game has been examined extensively. However the introduction of religion extends the analysis beyond the traditional literature. Religiosity alters the incentives, strategies, and payoffs of the game. I hypothesize that religious participation provides the potential for religious convictions which dissuade aggressive behaviour. In other words, in the presence of religious convictions the payoffs from acting aggressively decrease. Given the expected economic payoffs, individuals subsequently choose the amount of time they wish to devote to religious participation. In this way, the theoretical model draws a relationship between religiosity and economic welfare.

Considering a community with religion alters the game and the payoffs. Individuals have T time of which they devote r time to religious participation and T-r time to productive behaviour. Religious participation influences the probability of having religious convictions denoted by c. With a probability 1- θ an individual holds no religious convictions (c=0). With a probability θ an individual's religious convictions are drawn from a uniform distribution (F ~ unif

[0, c_H]).   An increase in religious participation increases the probability θ.   Thus, the first derivative of θ with respect to r is positive.   Hence, as religious participation increases the expected c (religious convictions) also increases.   Incorporating religious convictions makes the game as given below G*.

Player j

		A	C
Player i	A	$(2 - c_i, 2 - c_j)$	$(4 - c_i, 0)$
	C	$(0, 4 - c_j)$	$(3, 3)$

The game G* is noticeably different than game G. Religious convictions denoted by c modify the original payoffs. Specifically, religious convictions impose a disutility on aggressive behaviour.   Presumably, all mainline religious doctrines promote cooperative interaction and discourage exploitive, aggressive behaviour.   Therefore, religious convictions dissuade aggressive action and encourage cooperation, thus facilitating social capital formation.

If $c_i = c_j = 0$, both players hold no religious convictions and play the basic game G with a Nash Equilibrium (A,A) .   However, if c is greater than zero both players hold religious convictions and are deterred from aggressive action. In fact, if c is greater than a critical value both players will play cooperatively. In this, case cooperation (C,C) rather than aggression (A,A) is the Nash Equilibrium.   Let F(c*) be the fraction of the population with $c_i < c^*$.   The value c* reflects the critical value of religious conviction. If c is drawn from a uniform distribution and is greater than c* the individual will cooperate.   However if the drawn c is less than c* the individual will act aggressively.   In this way the values of c determine the equilibrium of game

G*. If c_i and c_j are sufficiently large, religious convictions encourage a cooperative equilibrium. However if c_i and c_j are small, aggressive behaviour may persist as the Nash Equilibrium.

With finite time T religious participation comes at the cost of productive behaviour. Increased time devoted to religious adherence reduces resources in the formal economic sector.   Despite promoting cooperative behaviour, religious involvement takes time from production. With a probability p, individuals engage in the religious interaction trading game, G*. However, with probability $1-p$, individuals receive zero payoffs.   The first derivative of p with respect to r is negative.   Therefore, as productive behaviour increases (religious participation decreases) the likelihood of playing G* and thus incurring positive payoffs increases.

Before pursuing further analysis, it is important to see the fundamental trade-off embedded in the model. Though increased religious participation entices the pareto dominant equilibrium in game G*, decreased productive behaviour reduces the likelihood of even playing the game and incurring payoffs.   Put conversely, increased productive time improves the probability of interactive trade, yet dissuades social capital formation and decreases cooperative payoffs.

Equilibrium

Using backward induction I will analyze the symmetric equilibrium of the game. Suppose individuals in community S devote given r* to religious participation. The interaction game G* will therefore consist of individuals who act cooperatively (c>c*) and individuals who act aggressively (c<c*).

The probability Player i plays cooperatively is given by:

(1) $\quad \theta[1 - F(c^*)]$

The probability Player i plays aggressively is given by:

(2) $\quad \{[1 - \theta] + \theta F(c^*)\}$

Therefore, the payoffs to a particular player with cost c from acting cooperatively are given by:

(3) $\quad 3\theta[1 - F(c^*)]$

while the payoffs from acting aggressively are given by:

(4) $\quad (2 - c)\{[1 - \theta] + \theta F(c^*)\} + (4 - c)\theta[1 - F(c^*)] \; = \; 2 - c + 2\theta[1 - F(c^*)]$

Equating (3) and (4) represents the marginal or indifferent player with conviction c^*

$$3\theta[1 - F(c^*)] \; = \; 2 - c^* + 2\theta[1 - F(c^*)]$$
$$2 - c^* \; = \; \theta[1 - F(c^*)]$$

Because $F \sim unif[0, c_H]$

$$2 - c^* = \theta[1 - \tfrac{c^*}{c_H}]$$
$$2 - \theta = c^*[1 - \tfrac{1}{c_H}]$$

Solving for c^* yields:

(5) $\quad c^*(r) = \dfrac{2 - \theta(r)}{1 - \frac{1}{c_H}} = \dfrac{c_H[2 - \theta(r)]}{c_H - 1}$

(6) $\quad \dfrac{c^*(r)}{c_H} = \dfrac{2 - \theta(r)}{c_H - 1}$

Equation (5) reflects the critical, cut-off value of cooperative behaviour. Convictions less than c* will lead to aggressive trading behaviour while convictions greater than c* will lead to cooperative trading behaviour. Therefore, a hypothesized change in c* affects the collective action of the community. Ceteris paribus, if c* decreases, the population with convictions above c* will increase, thus enhancing the incentive for cooperative behaviour. However if c*

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increases, the population with convictions above c* will decrease, thus diminishing community cooperation.

Comparative static analysis lends important insight to the affect of religious participation on the critical value c*. Because the first derivative of equation (5) is negative and the first derivative of θ with respect to r is positive, ceteris paribus, religious participation decreases the critical value c*.

$$\frac{\partial c^*(r)}{\partial \theta(r)} < 0 \quad \text{and} \quad \frac{\partial \theta}{\partial r} > 0 \text{ therefore } \frac{\partial c^*(r)}{\partial r} < 0$$

In other words, all else equal, as religious participation increases the population with convictions above c* increases, thus enticing community cooperation. Intuitively, this is a straightforward conclusion. As religious participation increases, the expected c (religious convictions) also increases. Increased convictions reduce the payoffs of aggressive action and encourage the cooperative equilibrium.

Theoretically, this reflects the social capital hypothesis. Social network participation fosters cooperation, coordination, and reciprocity thus yielding positive economic upshots. Increased religiosity encourages cooperative behaviour in society. This in turn raises individuals' incentives to cooperate. Cooperative behaviour is efficient, pareto-dominant, and thus welfare enhancing for all individuals.

An increase in the upper bound of the distribution has similar effects. A rise in c_H stretches the uniform distribution, boosts the mean, and increases expected religious conviction. Hence, all else equal, if c_H rises, c* declines, and community cooperation increases.

Therefore both increased religious participation and increased potential conviction strength dissuade aggressive action and encourage cooperation and social capital formation.

Despite enticing the pareto dominant equilibrium, religious participation diminishes productive time in the formal economic sector.   Next, I will analyze the trade off between religious involvement and productive activity.

With probability $1 - \theta$ player i is non-religous and receives payoffs:

(7) $2 + 2\theta[1 - F(c^*)]$

With probabily θ player i is religious and recieves payoffs:

(8) $2 - c + 2\theta[1 - 2F(c^*)]$ if $c < c^*$ (aggression)
           $3\theta[1 - F(c^*)]$ if $c > c^*$ (cooperation)

Therefore the expected utility of player i is:

(9) $EU = ([1 - \theta(r)]\{2 + 2\theta(r)[1 - F(c^*)]\} + \theta(r)\{\int_0^{c^*} 2 - c + 2\theta(r)[1 - F(c^*)]\}f(c)dc +$

           $\int_{c^*}^{c_H} 3\theta(r)[1 - F(c^*)]f(c)dc\})p(T - r)$

which simplifies to:

(10) $EU = \{2 + \theta^2(r) - \dfrac{2\theta^2(r)c^*}{c_H} + \dfrac{\theta^2(r)c^{*2}}{c_H^2} - \dfrac{\theta(r)c^{*2}}{c_H^2}\}p(T - r)$

Maximizing expected utility with respect to r yields r(c*).   This and equation (5) solve r* and c* as functions of the parameters of the model.   For the purpose of this study, however, I am interested in the effect of religious participation on economic welfare.   In the following exercise I will consider the interaction between religious time and expected payoffs.

Religiosity and Economic Welfare

In order to intuitively examine how changes in religious time affect expected payoffs, I conceive different parameters values and analyze how EU varies with r.

Case 1

Let:

$$\theta = M\left(\frac{r}{T}\right)$$

$$p = L\left(1 - \frac{r}{T}\right)$$

where $0 < M < 1$ and $0 < L < 1$

If $c_H = 3$, $T = 1$, $L = 0.5$, $M = 0.5$

$$EU = -0.008r^5 + 0.023r^4 - 0.141r^3 + 0.375r^2 - 1.25r + 1$$

$$\frac{\partial EU}{\partial r} = -0.039r^4 + 0.125r^3 - 0.633r^2 + 1.125r - 1.375$$

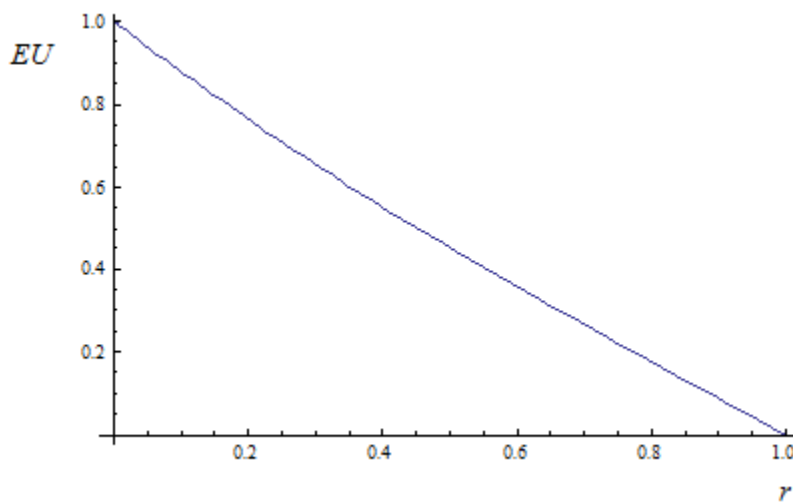Fig 1: Expected Payoffs and Religious Time (*Case 1*)

Figure 1 demonstrates a negative relationship between religious participation and expected payoffs. As time devoted to religious involvement increases, expected welfare declines. Recall, religious time encourages cooperative behaviour yet decreases the likelihood of incurring positive payoffs. In this case, the benefits of cooperation are outweighed by the costs to productive time. Cumulatively, religious participation decreases expected welfare. Notice that when r is equal to 1, all of time T is devoted to religious participation. In this case, the probability of playing game G* is zero and thus expected utility is also zero.

Now consider different parameter values. An interesting case emerges if c_H decreases.

Case2

If $c_H = 1.5$, $T = 1$, $M = 0.5$, $L = 0.5$

$$EU = -0.125r^5 + 1.063r^4 - 3.563r^3 + 5.625r^2 - 4r + 1$$

$$\frac{\partial EU}{\partial r} = -0.625r^4 + 4.25r^3 - 10.688r^2 + 11.25r - 4$$

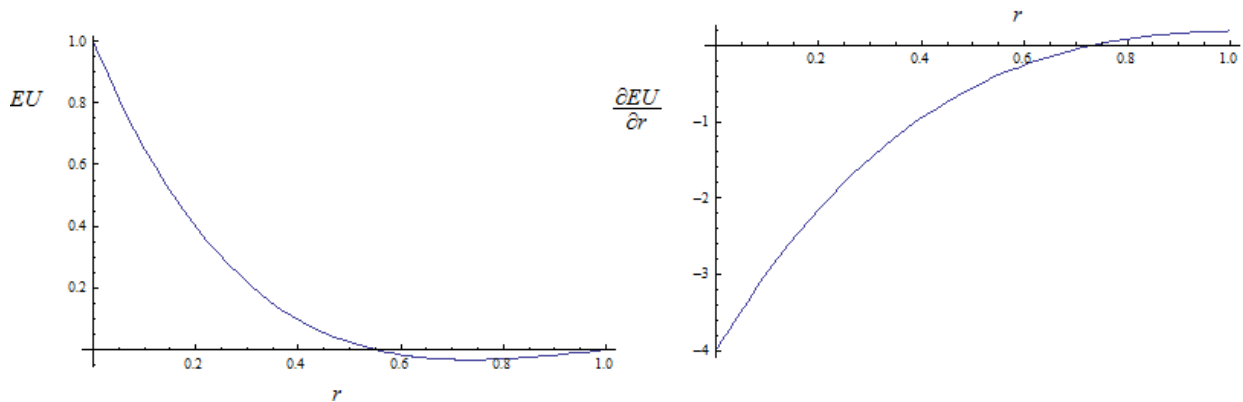Fig 2: Expected Payoffs and Religious Time (*Case 2*)

Figure 2 depicts a case in which expected payoffs initially decline and eventually rise as religious participation increases.   If r < 0.735 (less than 74% of time devoted to religious participation) than religious participation has a negative effect on expected welfare. However if r > 0.735 (more than 74% of time devoted to religious participation) than religious participation has a positive effect on expected welfare.

Intuitively, this case illustrates the underlying trade-off of religious involvement. Despite, enhanced productive activity, low rates of religious participation yield insufficient community cooperative behaviour.   In this case, the benefits of religious time are outweighed by the time costs to production.   Conversely, high rates of religious participation heighten collective cooperation, yet crowd out productive time. In this case the benefits of cooperative social capital outweigh the time costs to production.

I consider an additional case in the appendix. Changes in the parameter values alter the mapping of expected welfare and religious time; however the underlying trade-off of the model remains.   Ultimately, the purpose of the theoretical model is to highlight the twofold effect of religious involvement on economic performance.   Time devoted to religious involvement crowds out productive behaviour thereby diminishing economic potential.   Yet, religiosity produces beliefs which encourage cooperation and social capital formation, thus enhancing community welfare. In the following section, I will turn to the data and undertake an empirical assessment of religion in the United States.   The intention is to examine the total impact of religiosity on economic performance. Given the theorized positive and negative tendencies, I intend to uncover the empirical relationship present in the data.

IV.   Empirical Analysis

The empirical analysis will investigate the interaction between religiosity and economic activity. I utilize United States statistics and examine county-level data. Because religious participation is a form of social capital that is not easily transported, I will also consider the effect of religious involvement on population mobility and crime rates. I begin with a basic OLS analysis of religion and per capita income. Next, I check for reverse causality employing historical religious adherence as instrumental variable. Finally, I explore additional effects of religion, namely on crime rates and population mobility.

The United States, compared to other developed nations, is a religious anomaly. Seymour Martin Lispon (1991) notes that "America is the most religiously fecund country in the world" (qtd. in Magill, 2001). Four-fifths of Americans adhere to a mainline religious belief, 30-40% report weekly church attendance, and compared to other developed nations, the majority of citizens claim religion to be "very important" in their lives.   Yet despite its prevalence, religious participation in the United States has been steadily eroding for nearly forty years (Magill, 2001).   Since the late 1950s church attendance has decreased by roughly 25 percent. In recent years, evangelical faiths have gained numbers, however overall churchgoing and religious philanthropy have declined.

Nonetheless, religion remains infused in media, politics and American culture.   The twenty first century has witnessed religion thrust into everyday national discourse in a way not seen by recent generations. Religious issues such as same-sex marriage, abortion, prayer in schools, are consistently in the public spotlight. Furthermore, religion has played an increasing

role in the political forum. The present political climate in the United States has witnessed a formidable allegiance between the New Christian Right and secular conservatives. Iannaccone (1992) points out that the NCR has risen to prominence by accepting the economic agenda of secular conservatism. Similarly, Republicans arguably hold office thanks in large part due their embrace of the Christian moral agenda.

The effect of religion on economic performance in the United States is less evident. Per capita income has been steadily increasing in America over the past several decades. However a relationship with religiosity is unclear. Despite making concrete inroads into United States society, the effects of religion on American economic well-being are largely undetermined.

Figure 3 plots average religious attendance against average income in various states of the US after the 2004 presidential election. Average religious attendance is measured on a -2 to 2 scale; from "never" to "more than once a week". Average income is rescaled to zero. States that voted Democrat in the 2004 presidential election are in bold, while states that voted Republican are not bolded.

The scatter plot exhibits significant variation in religiosity across states. Republican states demonstrate increased religious attendance, while Democratic states demonstrate less religious participation. Moreover, there is an evident negative relationship between religiosity and income. Religious states display lower average income, while less religious states display higher average income. However, a more comprehensive analysis of the effect of religion on income requires the study of additional income determinants. To that end I look at a cross-section of 3138 counties in the United States in the year 2000. Controlling for economic and

demographic variables, I investigate whether variations in religious participation are associated with variations in per capita income.

Fig 3: Religious Attendance and Average Income
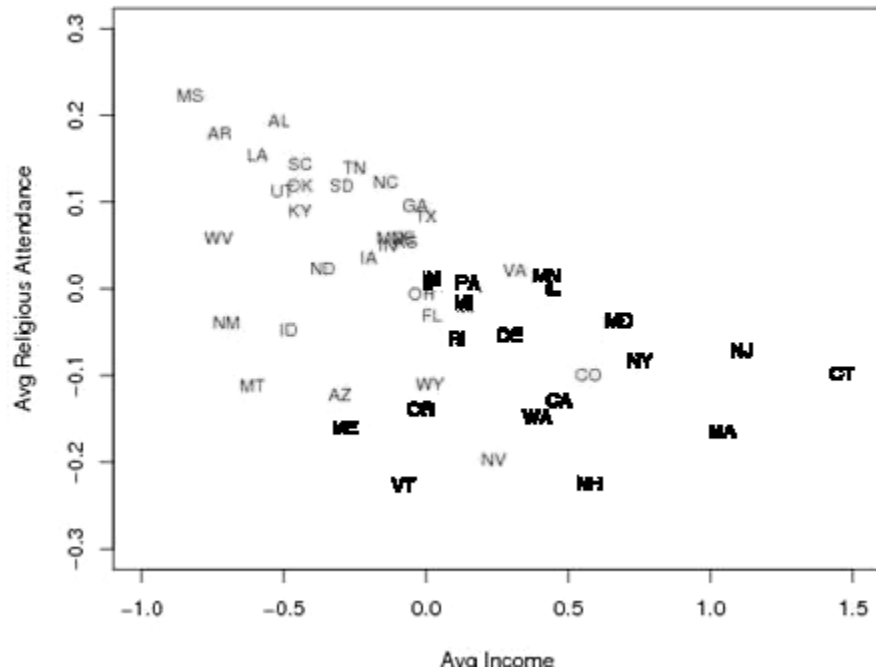
The data used in the empirical analysis consist of a cross-section of 3138 counties in the United States in the year 2000. Data on present religious participation is drawn from the Religious *Congregations and Membership Study, 2000 (County File)* a decennial survey with county-level membership statistics on 149 religious denominations in the United States. Data on historical religiosity is taken from Churches and *Church Membership in the United States, 1971, Counties* and contains county level adherent counts of 53 religious denominations.

A critical methodological problem is defining church membership. To achieve comparable data, two categories are established, membership and total adherents. Membership is defined as "all individuals with full membership status." Total adherents is

defined as "all members, including full members, their children and the estimated number of other participants who are not considered members; for example, the 'baptized,' 'those not confirmed,' 'those not eligible for communion,' 'those regularly attending services,' and the like." I employ the rate of religious mainline adherence in my empirical analysis. This variable is calculated as the total number of adherent per 1000 population. For 39 counties in 2000, and 26 in 1971, there are reported more total adherents than population. Reasonable explanations for this discrepancy include U.S. Census undercount, church membership over count, and county of residence differing from county of membership. I exclude these counties from the study.

In addition to data on religiosity, economic and demographic data is drawn from the U.S. Census Bureau 2000 Summary File 3. Table 1 summarizes the data utilized in the empirical analysis.

Table 1: Summary Statistics

Name	Variable	Obs	Mean	Std. Dev.	Min	Max
REL	Rate of adherence (mainline) per 1000 population (2000)	3138	141.78	113.59	0	884.03
PAST	Rate of aderence (all denominations) per 1000 population (1971)	3090	528.80	191.13	0	2326.58
INCOME	Per capita income (1999)	3138	17506.52	3938.89	5213	44962
URB	Percentage urban population (2000)	3138	40.14	30.99	0	100
MIN	Percentage minority population (2000)	3138	15.62	16.61	0	94.99
EDU	Percentage high school graduates (2000)	3138	74.74	8.25	33.03	91.89
AGE	Median age (2000)	3138	38.61	4.43	20.10	55.30
LAB	Percentage population (16+) in labourforce (2000)	3138	60.98	7.07	31.92	86.09
MOB	Population (5+) different house in 1995 (2000)	3138	35963.73	117329.80	14	3753068
POV	Percentage population with income (1999) below poverty level	3138	14.18	6.55	2.18	56.92
CRIME	Index crime rate per 100,000 population (2004)	2920	2771.10	1702.66	0	13654.17

In the empirical analysis, per capita income in each county constitutes the dependent variable; while urbanization, education, age, labour force participation, and minority population comprise the explanatory variables in addition to religious adherence.

Consider the model of the following form:

(1)   Income   = $\beta_0 + \beta_1$ Religous $+\beta_2$ Demographics $+ u$

Equation 1 is a straightforward expression of the hypothesized income determinants. **Income** denotes per capita income; **Religious** is a measure of current rates of religious adherence; and **Demographics** denotes a vector of demographic variables including urbanization, education, age, labour force participation, and minority population. Of initial interest is the affect of religious adherence (REL) on per capita income. As previously theorized, there is both a positive and negative influence of religiosity on economic performance; however what is the cumulative effect? Does the presumed social capital welfare improvement offset the supposed decrease in productive behaviour? In addition to religion, income per capita is presumably influenced by additional variables. Labour force participation (LAB) and educational attainment (EDU) signify the basic resource potential of each county and should therefore exhibit a positive relationship with per capita income (Heath, Waters, and Watson). Urbanization (URB) is hypothesized to foster scale economies in production and promote specialization of labour and capital (Becker). In fact, there is considerable international evidence that suggests percentage urban population is positively associated with per capita income levels (Herrick, Kindleberger; 1983). Accordingly, the coefficient on URB is expected to be positive. The effect of median age (AGE) and percentage minority population (MIN) is less

apparent. With age comes experience yet productive capacity presumably declines. Minority

population, though potentially advantageous for industry, may breed ethnic tension and social

fragmentation.   The OLS estimation results for Equation 1 are displayed in Table 2.

Table 2: Ordinary Least Squares (OLS) Estimation

Dependent Variable =Income

Variable	OLS
REL	-5.734**
	(0.487)
LAB	292.7795**
	(9.402)
EDU	52.4358**
	(8.006)
URB	44.8268**
	(1.802)
AGE	287.4111**
	(14.258)
MIN	6.8767*
	(3.539)
CONS	-16455.800
	(846.808)
R^2	0.534
N	3138

Standard Errors are in Parentheses
* Significant at 10% level
**Significant at the 5% level

The OLS results indicate a statistically significant negative relationship between income

and religiosity. Controlling for economic and demographic income determinants, an increase in

religious participation is associated with a decline in per capita income.   Furthermore as

expected labour force participation, educational attainment, and urbanization all exhibit a

significant positive influence on per capita income.   Interestingly age (AGE) demonstrates a

strong positive relationship with per capita income, while minority population (MIN) is

insignificant at the 5% confidence level.

Reverse Causality?

Of principal interest is the effect of religious participation on economic activity, however presumably the influence could move in the opposite direction. I hypothesize that religiosity influences income, however, income itself may affect religious behaviour. For OLS estimation to provide valid estimates, religious measures must be uncorrelated with the OLS error term. This assumption fails if religion itself is responsive to changes in per capita income. In fact, recent research has focused on the causal effect of economic development on religious participation. Known as the "secularization hypothesis", empirical studies have concluded that as countries become richer they tend to become less religious. If increased per capita income indeed does decrease religious participation, the OLS estimates of religiosity on economic performance will be biased downwards. Alternatively, if increased wealth enhances religiosity the OLS estimates of religiosity on economic performance will be biased upwards.

The traditional remedy for the endogenity bias of the OLS estimates is to capture the exogenous variation in the problematic variable using instrumental variable (IV) analysis. The criteria for a suitable instrument requires correlation with the explanatory variable of interest, however no correlation with the error term. In this study, I propose using historical rates of religious adherence as an instrument for current religious adherence. I utilize 1971 measures of religious adherents per 1000 population. The quality of this instrument depends on the variation in historical religiosity and the extent to which past religious adherence affects modern religious adherence. In addition, to qualify as a valid instrument, historical religiosity must be uncorrelated with variations in per capita income, captured by the error term u. Since

the religiosity of parents is often seen as an important determinant in children's involvement in religion, the degree of religious adherence in 1971 should influence that in 2000, but should have a minimal effect on current income given the large temporal separation.

Consider the model of the following form;

(1)   Income $=$ $\beta_0 + \beta_1$ Religous $+\beta_2$ Demographics $+ u$

(2)   Religious $=$ $\alpha_0 + \alpha_1$ Income $+ \alpha_2$ Past Religious $+ \alpha_3$ Demographics $+ e$

Equation 1 is as previous; however Equation 2 demonstrates the endogeneity of income and religion.   Religiosity presumably affects income; however income itself may be a determinant of religiosity.   The inclusion of **Past Religious** in Equation 2 reflects the fact that high historical rates of religious adherence are associated with high contemporary religious adherence because of intergenerational transmission of religious traditions. Furthermore, the omission of **Past Religious** in Equation 1 reflects the fact that due to large temporal separation historical religiosity has little influence on current economic activity. In this way, **Past Religious** qualifies as a valid instrumental variable. The results of 2SLS estimation are given in Table 3, column 2. For comparison, the results of OLS estimation are given in column 1.

My empirical results demonstrate that religious adherence and per capita income still exhibit a significant negative relationship.   Holding economic and demographic variables constant, an increase in county religious participation is associated with a decrease in per capita income.   The 2SLS coefficient estimate of religiosity (REL) is "more negative" than the OLS coefficient. In other words, in the absence of instrumentation the OLS estimate is biased upwards. The sign and magnitude of the coefficient on the explanatory economic and

demographic variables are as expected. Again age (AGE) demonstrates a positive relationship with per capita income, while minority population remains insignificant at a 5% confidence level.

Table 3: Two-Stage Least Squares (2SLS) Estimation

Dependent Variable = Income

Variable	OLS	2SLS
REL	-5.734** (0.487)	-11.801** (1.242)
LAB	292.7795** (9.402)	309.654** (10.582)
EDU	52.4358** (8.006)	66.453** (8.500)
URB	44.8268** (1.802)	40.912** (2.013)
AGE	287.4111** (14.258)	341.059** (17.943)
MIN	6.8767* (3.539)	6.302* (3.701)
CONS	-16455.800** (846.808)	19600.000** (1069.237)
R^2	0.534	0.515
N	3138	3090

Standard Errors are in Parentheses
* Significant at 10% level
**Significant at the 5% level

These results lend important conclusions to the analysis. Theoretically, religious participation exerts both a positive and negative influence on economic performance. Religiosity breeds social capital which enhances cooperation, coordination, and the pareto-dominant outcome. However, involvement in a religious social network comes at the cost of time in the productive economic sector and thus presumably diminishes economic potential. My empirical findings suggest that in the United States the negative effect of religiosity

dominates. The decrease in per capita income from reduced productive time outweighs the increase in per capita income generated from religious social capital formation. Cumulatively, this translates as a significant negative relationship between religious activity and economic performance. With more access to more data, it would be possible separate these opposing affects.   The inclusion of a variable quantifying religious conviction would theoretically isolate the positive influence of religiosity. Barro and McCleary (2003), for example, find empirical evidence that measures of religious beliefs encourage national growth, while measures of church attendance depress national growth.

My empirical results mirror the statistical findings of Heath, Waters, and Watson. In a cross sectional state analysis of religious fundamentalism and per capita income, they too discover a negative relationship in the United States. Unlike this study however, the authors posit that fundamentalist movements encourage a less liberal economic environment and therein depress free market capitalism and presumably income growth.

Additional Effects of Religious Participation

Of further interest is the effect of religiosity on additional demographics, namely population mobility and crime rates. As theorized, religious participation facilitates the formation of social capital. In other words, church attendance promotes networks, reciprocity, and fellowship.   Presumably, this type of social environment encourages community attachment and reduces the incentive for individuals and family units to migrate elsewhere. Therefore, as religious participation increases, population mobility should theoretically decline. Furthermore, a cohesive cooperative community should discourage aggressive interaction.

Thus religious involvement should theoretically exhibit negative tendencies on the instance of crime.

The estimated model is similar to the former. Population mobility and index crime rates are right hand side dependent variables while religiosity, urbanization, schooling, age, labour force participation and minority population again constitute the left hand side explanatory variables. Additionally, per capita income, poverty rate are entered as determinants of migration and crime. The variable used for population mobility is the total population (5+) in the year 2000 that live in a different house than in the year 1995. In effect, this statistics reflects the number of individuals who have physically moved between 1995 and 2000. The variable used for crime is the index crime rate per 100,000 population.

Unlike per capita income, population mobility is not likely to demonstrate an endogeniety bias. Indeed, religiosity theoretically affects migration. However, the reverse causal relationship, migration affecting religion, is less apparent. Therefore I employ basic OLS analysis to estimate the effect of religiosity on population mobility. Crime rates, on the other hand, may suffer from reverse causality. Religion presumably influences the rate of crime; however crime may affect religious behaviour (Heaton, 2006). Similar to the previous analysis, I employ both OLS and 2SLS estimation utilizing historical religiosity as an instrumental variable. The regression results are presented in Table 4. Column 1 gives OLS estimation results for population mobility. Column 2 gives the OLS estimation results for crime rates. Finally, column 3 gives the 2SLS estimation results for crime rates.

Table 4: Population Mobility and Crime Rates

Variable	MOB	CRIME	
	OLS	OLS	2SLS
REL	-29.259	-1.597**	-4.361**
	(20.201)	(0.266)	(0.726)
LAB	-268.213	11.614*	26.297**
	(453.325)	(6.013)	(7.724)
EDU	-274.774	0.240	6.088
	(325.452)	(4.320)	(4.627)
URB	946.000**	24.835**	23.762**
	(85.481)	(1.037)	(1.094)
AGE	121.983	-16.640**	9.142
	(613.131)	(8.132)	(10.987)
MIN	879.804**	25.247**	24.851**
	(162.856)	(2.110)	(2.183)
INCOME	8.692**	-0.030**	-0.051**
	(0.803)	(0.011)	(0.013)
POV	1083.240*	-4.381	-7.796
	(575.952)	(7.644)	(7.938)
CRIME	1.003		
	(1.396)		
CONS	-149621.500**	2099.661**	629.334
	(47698.440)	(631.891)	(751.753)
R^2	0.216	0.362	0.333
N	2920	2920	2883

Standard Errors are in Parentheses
* Significant at 10% level
**Significant at the 5% level

The empirical results indicate that religious participation exerts a negative effect on the instance of crime; however religion has a negative but insignificant effect on population mobility. This suggests religious participation may indeed reduce aggressive behaviour, however does not have much influence migration decisions. With R-squared values of 0.216, 0.362, and 0.333 less than 33% of the variation in the dependent variables are explained by the hypothesized variables. Certainly, this analysis is limited and additional explanatory variables are required. However the results, though limited, yield promise for future study.

V.   Conclusions

This paper investigates the relationship between religiosity, social capital, and economic performance. I build on past studies and theorize a twofold affect of religious participation. Recent economic literature has emphasized the importance of social capital on economic growth. Religious communities arguably foster social capital and hence encourage collective prosperity. However, religious involvement crowds out productive time in the economic sector and thus diminishes economic potential. I develop a model highlighting this trade-off. Constructing different cases, I examine how expected welfare varies with religious time. As religious participation increases the pareto-optimal cooperative equilibrium is more likely, however the probability of incurring positive payoffs of an interactive trading game decreases.

I turn my attention to religious data in the United States. Employing OLS and 2SLS regression analysis on 3138 American counties, I discover a dominant negative relationship between religiosity and per capita income.   Cumulatively, religious activity crowds out productive activity. Increased religious adherence decreases county per capita income. The conclusions of this analysis not only speak to the effects of religiosity, but more generally the influence of social capital.   Despite, the theoretic economic gains from coordination, cooperation, and fellowship; participation in a social network reduces time in the formal economic sector and demonstrates a negative tendency on economic performance.   In addition, I examine the effect of religiosity on population mobility and crime rates. My findings suggest that religious adherence has a significant negative influence on the instance of crime. The effect on population mobility, though negative, is insignificant at the 10% confidence level.

The implications of religion and social capital are only beginning to gain footing in economic literature. The sheer prevalence of religiosity in the developed and developing world certainly warrants academic investigation. Yet, this study lends important theoretical and empirical insights into the economic effects of religious involvement. The demonstrated interaction between religiosity, social capital, and economic welfare is a noteworthy addition to the existing literature. Further examination is necessarily required; however my findings hold significant promise for future analysis.

Basic Theoretical Model: Additional Case

Case 3

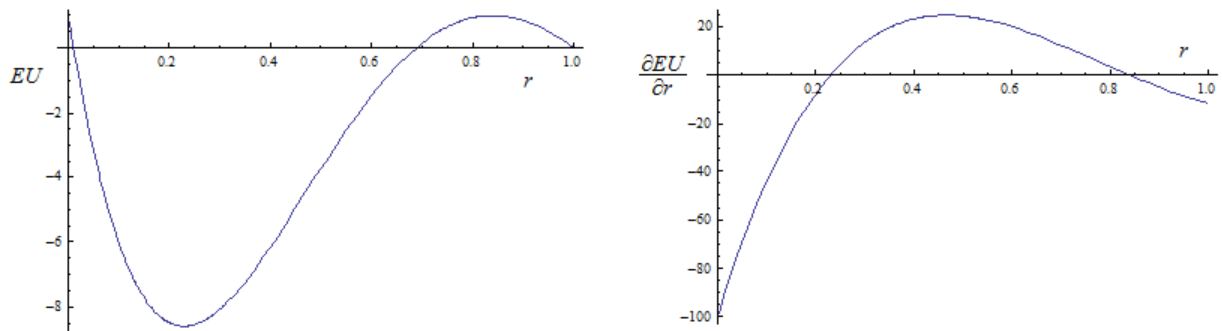If $c_H = 1.1$, $T = 1$, $L = 0.9$, $M = 0.5$

$EU = -32.81r^5 + 191.362r^4 - 393.862r^3 + 334.305r^2 - 100r + 1$

$\dfrac{\partial EU}{\partial r} = -164.025r^4 + 765.45r^3 - 1181.59r^2 + 668.61r - 100$

Fig 4: Expected Payoffs and Religious Time (*Case 3*)

In this case, religious participation has a negative effect on expected payoffs for rates of participation that are too low *and* too high. If time devoted to religious involvement is less than 23% or more than 84% than expected welfare falls with religious participation. This reflects the idea that when religious participation is too low the benefits of increased productive time are outweighed by costs of decreased religious time. Likewise, when religious participation is too high, the benefits of increased religious time are outweighed by the costs of diminished productive time. However, if time devoted to religious participation is in moderation, between

23% and 84%, religious participation has a positive effect on expected welfare. In this range,

religiosity enhances payoffs, despite potential losses in the productive sector.

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