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Abstract: In this paper we present an economic model contributing to the explanation of religious schism, a topic mostly dealt with in the fields of sociology and psychology so far. The main idea is to see religious groups as clubs and social networks. These networks may serve as a device for exchanging information about and via other members. Two effects are implied by this view. On the one hand, the more members a network has, the more anonymous it gets, meaning that the signals one can receive about the type of some other are getting worse. On the other hand, the larger a network is, the more potentially valuable information is available. A modernizing economy is characterized by an increasing number of transactions with an increasing number of partners, leading to increasing transaction costs. It might be profitable for groups to split up in this economic environment in order to economize on these transaction costs. In our view, our findings also contribute to the explanation of the so-called Kelley Thesis, stating that religious movements with stricter enforcement of their behavioural norms are growing in size, while such with rather liberal attitudes toward their norm enforcement face a loss of members. Historical and empirical results supporting our line of argument are presented.

Key words: Religion, Social Norms, Social Capital, Social Networks

JEL Classification: O17, Z12, Z13

1. Introduction

In a recent paper, Leeson (2005) argued that social heterogeneity is not per se a cause of lacking economic growth. He presented the case of pre-colonial Africa as supporting his argument. Before colonialization African tribes managed to trade over long distances, thereby overcoming social heterogeneity by providing reliable signals about being a cooperator. An individual’s relationship to authority and community, land usage, and religious practice could serve as such signals, according to Leeson. However, after having been colonialized, reliable signaling was no longer possible since colonial institutions imposed “signaling noise”, washing away the “value of a signal”.

Building on this idea, we want to expand the range of its applicability. More specifically, we believe that this approach may be serving as contributing to the explanation for the phenomenon of denominational schism in the USA of today.

The following reasoning is at the heart of the approach. Three “classes” of potential trading partners can be identified; direct friends, network members, i.e. people sharing one specific signal, and non-network members, i.e. “all others”. From direct friends no signal is needed since his type is known for sure. Network members can (more or less successfully) signal their type while non-network members can not. In our case religious affiliation will serve as signal. The gains from trade with these different classes differ, due to transaction costs.
The remaining will be organized as follows. In the first section we will present a formal model of the core of the reasoning stated above, showing that reducing the size of the club or network can be advantageous. In the second section we will line out some important features of a modernizing economy, namely the increase in total transaction costs. In section three we will give an interpretation of religious groups as clubs or networks. Both terms – clubs and networks – will be used for describing religious groups. Section four and five will lead the focus on the analysis of schism. An empirical study of the relationship between religious schism and different measures of economic success will follow in section six. Concluding remarks will end the paper.

1. Modeling Different Effects of Network Size

As stated above, Leeson (2005) identifies three “classes” of potential trading partners; direct friends, network members, i.e. people sharing one specific signal, and non-network members, i.e. “all others”. We will formalize this idea in the following, taking a strictly individualistic view. I.e., we define the utility of a representative individual as depending of signals about the type of other individuals and the amount of information available to it.

We assume that the utility of an individual joining a group or network is determined by three factors. The first is an increased quality of signals about the types of other actors from within the network. We will label this quality of the signal $s$. It is a function of the size of the network, $X$, and some probability $\tau$ that information about others is being transmitted correctly. One could interpret this probability as measure for “honesty” within the network. The second important influence on the utility of a network member derives from the amount of information available to it, which we will label $g$. Just like the quality of a signal, the amount of information is a function of the size of the network, $X$, and of some “loss” $\nu$ if the information is not received from a direct acquainted. As third factor, we identify psychological, sociological and other aspects, $c$, which we will hold constant for the sake of simplicity\(^1\).

Formally, the utility of this individual could therefore be defined as:

\[
\begin{align*}
  u &= u(s, g, c) \\
  s &= s(x, \tau) \\
  g &= g(x, \nu)
\end{align*}
\]

In the following, we will focus on discussing the two informational terms in more detail.

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\(^1\) This does not mean, of course, that these factors do not play an important role or are necessarily independent from the network size. We would simply like to point to something else.
1.1. The Quality of a Signal

Reliable signals about the type of a potential trading partner can substitute costly contracting procedures. Networks are an institutional arrangement which provide a basis for the exchange of signals about other network members. However, with increasing size of the network the value of the signals may decrease. We will formally present this argument referring to Bowles and Gintis (2004) as follows.

Consider a static setting. In a network of \(X\) individuals each individual knows the type of \(k\) others. In a first step, only network members are matched randomly. This assumption is relaxed in section 1.2. Whenever a network member \(x_i\) wants to find out about the type of some other network member \(x_j\), he can either know this \(x_j\) himself or ask another member \(x_k\) of the network whether he knows the type of \(x_j\). \(x_k\) will supply some signal \(q\) about \(x_j\) if he knows him. If this is the case, the informant \(x_k\) will correctly inform \(x_i\) about the type of \(x_j\) with probability \(\tau\). However, if \(x_k\) does not know \(x_j\), the individual \(x_i\) will have to consult someone else. Formally, this idea can be presented as follows, \(s\) again presenting the value of the signal that \(x_i\) can receive about the type of \(x_j\):

\[
s = \frac{k}{X} + (1 - \frac{k}{X})q
\]

\(\frac{k}{X}\) presents the probability that \(x_i\) knows \(x_j\) himself. Therefore, he will have to ask some other network member with the probability \((1 - \frac{k}{X})\). Again, this other member will know \(x_j\) with probability \(\frac{k}{X}\) and inform \(x_i\) correctly with probability \(\tau\). With probability \((1 - \frac{k}{X})\) the other network member will not know \(x_j\) and \(x_i\) will have to ask another member, who again will supply some signal \(q\). Formally:

\[
q = \frac{k}{X} \tau + (1 - \frac{k}{X})q
\]

This procedure continues, leading to the value of the signal:

\[
s = \frac{k}{X} + (1 - \frac{k}{X})\tau
\]

In this case the first derivative of the quality of the signal with respect to the size of the network is:

\[
\frac{\partial s}{\partial X} = -\frac{k}{X^2} + \frac{k}{X^2} \tau = \frac{k}{X^2} (\tau - 1) < 0
\]
Since \( \tau < 1 \), the term is clearly negative. An increase in the size of the network is associated with a decrease in the value of the signal one member can receive about the type of some other network member, and vice versa. A reduction in the size of the network can lead to an increase of the signal value. It should be mentioned at this point that an increase of the probability that an informant will correctly pass information about an acquaintance, \( \tau \), is also associated with an increase of the quality of the signal. An increase in \( \tau \) can therefore be a substitute for a decrease in size.

### 1.2. Allowing for matching with non-network members

Consider the case of allowing contact to non-network members. One then has to distinguish between “acquainted in the network” and “acquainted outside the network”. Let’s assume that each individual knows \( K \) others. These \( K \) others could either belong to the same network or not. Those who belong to the same network will be labelled \( k_N \), those who do not \( k_{NN} \). Formally,

\[
K = k_N + k_{NN}.
\]

Now the signal quality changes. Assume that from directly known individuals one receives a “good signal”, i.e., a signal of value 1, whereas one only receives some portion \( \tau < 1 \) from network members and an even smaller portion \( 0 < \mu < \tau \) from non-network members about the type of a randomly met trading partner. The size of the network is again labelled \( X \), the society as whole has the size \( N, N \gg X \). The overall signal value can then be derived:

\[
s = \left[ \frac{k_N}{X} + (1 - \frac{k_N}{X})\tau \right] + \left[ \frac{k_{NN}}{N - X} + (1 - \frac{k_{NN}}{N - X})\mu \right].
\]

The first term refers to our basic model where only contact to network members is allowed. The second term extends this observation by the contact to non-network members. The effect of an increase in size now changes to:

\[
\frac{\partial s}{\partial X} = \left[ \frac{k_N}{X^2} (\tau - 1) \right] + \left[ \frac{k_{NN}}{(N - X)^2} (1 - \mu) \right]
\]

The first term is negative, as we have seen in our previous model. Unfortunately, the second term is positive. In order to check whether the overall effect is negative, let’s assume that the first term is bigger than the second one. This is the case iff:

\[
\left| \frac{k_N}{X^2} (\tau - 1) \right| > \left| \frac{k_{NN}}{(N - X)^2} (1 - \mu) \right|
\]
(12) \[ \frac{k_N}{X^2} (1 - \tau) > \frac{k_{NN}}{(N - X)^2} (1 - \mu) \]

(13) \[ \frac{k_N (N - X)^2}{k_{NN} X^2} > \frac{(1 - \mu)}{(1 - \tau)} \]

This means that, if it is not the case that one has extremely many more friends outside the network than within, then the overall effect of an increase in size will be negative\(^2\).

### 1.3. Amount of Information

Regarding the quality of a signal about others, a small network is advantageous compared to a larger one, given that the number of people each network member knows and the probability that information will be passed on correctly are equal. However, larger networks can have the advantage of making a larger amount of information available, meaning that the more people are members in a specific network, the more information is likely to be circulated in this network. Assume that each member of the network has one unit of information which could be of value to all other members. Applying the same logic as in the previous subsection, every individual knows \(k\) others. From these direct acquainted the whole unit of information can be received without loss. However, information received indirectly via the \((X-k)\) other network members, faces some loss of \(\gamma\). One can think of not openly passing information to strangers. Formally, the amount of information available to each member is therefore:

\[ g = k + (X - k) \gamma \]

Clearly the first derivative with respect to \(X\) is \(\gamma\) and therefore positive\(^3\). This means that an increase in the network size is associated with an increase in the amount of information available to each member.

The amount of information is dependent on \(\gamma\), the degree of “closeness” of the members. This closeness may be in turn dependent on the level of trust within a network. The higher the level of trust within a network, the higher is the amount of information available from a specific stranger in the network. From this point of view, a higher level of trust might offset shortcomings of size. Therefore, a new group which split up from a pre-existing one, could

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\(^2\) It seems unreasonable to expect that the effect of even having extremely more friends outside the network than within can outweigh the second ratio on the left hand side, since the latter is weighted with squares.

\(^3\) Note that in this formulation the “average member” does not know a new member directly. Thus, the first derivative in this formulation actually underestimates the true amount of information. With some positive probability the average member will know a new member who will provide the whole unit of information instead of the portion \(\gamma\) only.
profit from its potentially higher level of trust. Even though the overall amount of information is now smaller, the information available to each member individually might not be reduced by the same amount as the overall amount of information.

We are well aware of the limitations of the model chosen, especially of the assumption that the full amount of information being passed around in a network is potentially available to all members. However, we think that this does not change our intuitive result that an increasing size of a network increases the potentially available information for each individual. Without a formal presentation, one might consider an alternative model relating to the issue of the quality of a signal. Again each individual $x_i$ knows $k$ others. For the sake of clarity, we will name these “first round acquaintances” $k_{i1}$. Assume now that each of these $k_{i1}$ individuals will provide the individual $x_i$ looking for information with information of their respective acquainted people as well. We will call these “acquainted of an acquaintance” $k_{i2}$. Crucial for the amount of information available for each individual is the fact that the $k_{i2}$ people known by each of the $k_{i1}$ acquainted of some individual $x_i$ might know each other. If they do so, this would reduce the amount of information available for $x_i$. But now an increase in the number of network members decreases the probability of these “double-acquaintances”, therefore increasing the amount of information available to each individual. Thus, we regard our model as incorporating our intuition of positive informational aspects of an increase in network size.

2. Transaction Costs and the Size of Networks

In a more and more integrating economy, meaning a growing number of transactions among an increasing number of partners, people may economize on transaction costs by relying on personalized trade rather than on anonymous transactions. This idea refers to North (1984). He observes that the transaction sector of economies is growing over time, as the economy becomes more and more modern. He states that mainly three factors are driving this development, namely growing specialization, increasing costs per transaction due to the change to anonymous interactions and rent-seeking activities of diverse groups (North 1984, p. 263). Obviously, the idea of increasing costs per transaction due to anonymity is related to our assumption. But also the increasing number of exchanges in a more and more specializing economy can be regarded as in line with our assumption since the overall amount of
transaction costs from this development tend to increase, even if no increasing costs per transaction are assumed.4

But why is this so? And even more important, how can networks overcome this problem? Anonymous transactions have to be enforced and “safe-guarded” by some external mechanism what might be costly or even impossible. Within a network, reputation can be a substitute for this external mechanism since other members of the network might refuse to trade with people from which they know that they did not deliver the agreed upon service or good in former transactions. Network members therefore provide signals about the type of potential trading partners. Moreover, since more and more potential trading partners or options become available, individuals could be used as sources of information concerning other important aspects of life, e.g., what job is offered somewhere or who is looking for a job.

This idea is based on the works of Bowles and Gintis (2004) and Kranton (1996). In the former model an increase in the number of members of a network leads to a decrease in the value of a signal that one member might receive about another. But on the other hand, an increase in the number of members of a network enlarges the amount of information which is available to the individuals. A formal presentation of these ideas is offered in the next section.

Without going into the details, in the model of Kranton (1996) people might either engage in anonymous market transactions or in personal transactions within networks. On the market, people may face a higher risk of being cheated by an anonymous trading partner. By engaging in a personal network, people can avoid this risk, relying on the reputation mechanism. However, within a small network, one can only buy what is offered by the members of the network. Therefore, a market may provide a larger amount and variety of goods. For our purpose it seems enough to simply keep the basic trade off in mind, stating that people could either engage in anonymous transactions or in network transactions, both having specific advantages and disadvantages. Even more important, these advantages depend on the number of people engaging in the respective form of transaction, implying an optimal size and number of networks. Various studies seem to confirm the idea that “group size matters” both on empirical and theoretical basis. (see, e.g., Carpenter (2004), J. A. Wagner III (1995), Isaac and Walker (1998), La Porta et al. (1997), Olson (1965) and Putnam (1993, 1995))

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4 This seems to be important in the light of North (1991), where it is stated that in an urbanizing society impersonal contract enforcement is needed “because personal ties, voluntaristic constraints, and ostracism are no longer effective as more complex and impersonal forms of exchange emerge.” (p. 100). However, we assume that the re-emergence of personal transactions might be a substitute or complement for impersonal contract enforcement (Schaefer and Ott, 2004, pp. 355-374).
3. Religious Groups as Clubs

In the mainstream sociology religion is regarded as a social activity (see Durkheim, 1995) and religious group participation brings social interaction with community members. One of the benefits of joining into a religious community is giving signals to the rest of the community about individual’s credibility. Sosis and Alcorta (2003) give a detailed literature of sociology explaining that religion as a mechanism that enhances a group’s longevity, and one of the primary functions of religion is the promotion of group solidarity. Sosis and Ruffle (2003) conduct experiments on Israeli Kibbutzim that were aimed at measuring individual cooperative decision making. Their analysis supports the thesis that collective religious ritual as enabling the expression and reaffirmation of shared beliefs, norms and values and are thus essential for maintaining communal stability and group harmony and that it can promote cooperation. Accordingly, the signalling mechanism in the pre-colonial Africa presented by Leeson (2005) has been an important factor for cooperation and to increase transactions. Leeson (2005, 85) points out the role of religious practice and association as focal signals enabling exchange among pre-colonial Africans and long distance traders were bound together by religion. It seems plausible that religion has served and still serves this purpose in other parts of the world as well.

In order to understand the signalling mechanism and how this mechanism leads to fractionalization, one can see religious groups as “clubs” providing reputation. A club is a voluntary group deriving mutual benefit from sharing one or more of the following: production costs, the members' characteristics, or a good characterised by excludable benefits (Sandler and Tschirhart, 1980). Here, religious activity can be regarded as a club good which is an impure (congestible) public good for which exclusion is possible or membership fees can be determined by sacrifice and stigma to allow exclusion (Iannaccone, 1992). The main feature of club goods, different than private goods is that clubs offer mutual benefits such that members derive benefits purely from association, so that an individual's benefits may be increasing in the size of the club $X$ when $X$ is sufficiently small. Since the facility is congestible, however, the arrival of new members will eventually reduce the benefits enjoyed by existing members. One can think of the “quantity” of the public good provided by the facility as reputation by being a member, and the “quality” of its amenities (signalling value of reputation) as varying with $X$. That both the cost per member and the “quality” of the good fall as $X$ increases when $X$ is sufficiently large suggests that the optimal size of membership is bounded.
According to Buchanan (1965, 3), for any public good or service, regardless of its ultimate place along the conceptual public-private spectrum, the utility that an individual receives from its consumption depends on the number of the other persons with whom he must share its benefits. For private goods, it is a common conception that group size does not need to be included in the utility functions of individuals, since the optimal club size is unity. However, in club goods, club size variables should be explicitly included. In the figure 1 below, the total benefit (B) and total cost (C) curves are drawn for a given quantity of a collective good. Buchanan assumes identical tastes and equal cost sharing for all individuals for simplicity and with these assumptions, the curve C takes the form given in figure 1. The shape of B is determined as more people join to share a club good. The benefit evaluation of an individual will decline due to congestion. With these cost and benefit curves, utility maximization will occur where the slopes of benefit (B) and costs (C) are equal, determining the optimal number of persons in a club.

4. The Importance of Small Religious Communities

The power of religious groups in terms of signalling depends on how effectively they create trust for cooperation motives and to decrease free-riding. As we have seen before, the signalling power of a club is a function of member size. Sosis (2003) also argues that although everybody may gain if all group members invest in the cooperative goal, attaining such large scale cooperation is often difficult without social mechanisms limiting the potential for some group members to free-ride on the efforts of others. Therefore, whenever an individual can achieve net benefits from defection, the only credible signals of cooperative intentions are those that are costly to fake. If commitment signals are not costly to fake, they can easily be imitated by free-riders who do not intend to invest in the cooperative pursuit. Cooperation is
facilitated because those who are uncommitted can be avoided as partners in collective action since they will find it too expensive to pay the costs of religious behaviour. Adam Smith probably was one of the first who claimed religious sects as being important for monitoring and the creation of reputation which is essential for trust and cooperation within communities (Anderson (1988, p.1070)).

Smith was also interested in explaining the economic incentives for individuals to choose to participate in religious activities. He offered an explanation for such behaviour based on his theory of the capital value of reputation. According to him, religions tend to produce and distribute moral information about individual members. By joining such a club, an individual of the lower orders, with little wealth and no established reputation and references, is able to provide information to potential employers, lenders, and service providers that signals that he or she represents a relatively low risk in terms of potential transactions. By providing valuable, reliable information concerning the level of risk attached to dealings with particular individuals, religious sects both benefit their members in a tangible way and also improve the efficiency of allocation of human resources (see Anderson (1988, p.1070)). According to Iannaccone (1992) modelling religious groups as clubs, argue that monitoring costs increase with group size and there is a trade off between sacrifice and economies of scale. Stricter churches which are in general small sects, are more likely to be successful in achieving their collective goals than lenient churches. Strict demands strengthen a church in three ways: they raise overall levels of commitment, they increase average rates of participation, and they enhance the net benefits of membership.

5. Schism and Religious Fractionalization in the U.S.A

The importance of religion in America takes considerable attention in the field. Iannoccone reports that (1992, 1994) ninety percent of Americans claim to have a religion and more than 60 percent are formal members of a church or synagogue, and 40 percent actually attend religious services in a typical week. The “market” of religion also is very competitive with numerous denominations and sects. One of the main reasons of this diversity is in the nature of Protestantism, having no spiritual leadership to create a hierarchical religious institution and therefore allowing different sects and denominations. As a consequence, schism is a rather common phenomenon.

5 All these three elements are being used in considerable manner within sects in order to reduce the free rider problem. (Iannaccone (1994, 1204)).
Schism is mostly defined as “the successful formation of a new denomination as a result of a break from a pre-existing denomination” (Liebman et al. 1988, p. 344). Sutton and Chaves (2004) define denominations as “national-level organizations characterized by both a religious authority structure and an agency structure” (p. 172). Therefore, denominations, in a sense, organize congregations, which are “the fundamental unit of denominations.” (p. 172).

Schism may be driven by external or internal influences. As Sutton and Chaves (2004) point out, the technical or task environment and the institutional or cultural environment may be regarded as external influences on schism. The former relates to material and informational issues. These components may determine how well an organization can achieve its core goals. The cultural environment relates to legitimacy in the sense that the internal structures of an organization should match the normative expectations of the members. Niebuhr (1965), e.g., can be set into the latter line of argumentation. He sees “the heterogeneity of an immigrant population, and the presence of two distinct races” (Niebuhr 1965, p. 135) as of “primary importance […] for the rise of wholly American schisms” (p. 135). Another factor, according to Niebuhr (1965), is the change in structure which occurred after immigration. “America replaced the horizontal lines of European class structure with the vertical lines of a sectionalized society and continued or originated church schisms in accordance with that pattern of provincial organization of East and West and North and South which underlies its economic and political history”. (p. 135) Therefore, the normative expectations of the population were too divergent to be matched by one single denomination. Consequently, schism appeared to be an adequate solution to resolve the conflict.

Sutton and Chaves (2004) distinguish three internal influences on schism. Efforts within an organization to consolidate can be regarded as one of these internal forces. Consolidation means that some sort of reorganization takes place. This new organizational structure may not meet the requirements of the members or it may be inferior to the preexisting one on some other basis. A potential for intra-denominational dissent is another internal influence on schism. Given that a denomination is extremely heterogeneous, some members may try to establish another, smaller denomination which they think to suit their imaginations to a higher degree and furthermore to exclude other “disturbing” members. As a third internal influence, Sutton and Chaves (2004) identify congregational autonomy. The more autonomous different local groups are from the central denomination, the more likely schism is to occur.

Liebman et al. (1988) were the first to analyze schism in the United States for the case of Protestant denominations on an empirical basis. The analysis was later expanded by Sutton and Chaves (2004). Especially Sutton and Chaves (2004) state that they “remain in the...
Niebuhrian tradition of seeing social conflict at the root of schism”, but that they “differ from that tradition insofar as [they] see organizational rather than identity variables as the causal mechanism” (Sutton and Chaves 2004, p. 172). Their major finding is that resistance to attempts at consolidating religious organizations seems to be driving denominational schism (p. 188).

The major assumption of both studies is that “schism is related to the organizational characteristics of denominations” (Liebman et al. 1988, p. 343), mainly the size of the denomination. This assumption is the only one to survive the empirical testing of the authors. They state that “[t]he most powerful single predictor of schism is the size as measured by denominational membership: the larger the denomination, the greater the tendency to schism. […] Our best speculation is that growth raises problems of boundary-maintenance for denominations and opens opportunities for insurgent groups to appropriate resources and strike out on their own.” (Liebman et al. 1988, p. 351) This argumentation is supported by the so-called Kelley Thesis. It states that more liberal, ecumenical churches which are assumed to be large in size, are declining in church membership, while more conservative, fundamentalist churches which are assumed to be rather small in size, are increasing in membership (Spilka et al. 1985, p. 241).

We believe that the results of our analysis in the first section, namely that honesty can offset negative effects of an increase in group size, may give an answer to this puzzle. As mentioned above, this thesis states that liberal denominations are decreasing in size, while more radical denominations are increasing in size. As Spilka et al. (2003) state, “Kelley’s thesis is more relevant to the strictness of religious groups in the enforcement of their beliefs and behavioural norms than to their strictness in the content of the beliefs they profess.” (p. 412). In our terms, strictness therefore could refer to the correct passing of information if honesty is seen as a behavioural norm within the religious group. An increase in honesty could therefore be a substitute for decreasing size, at least partly. A religious movement could compensate for the decreasing value of the signal resulting from an increase in the number of members by making its enforcement of behavioural norms stricter. We therefore think that our model could contribute a theoretical approach to the understanding of the Kelley Thesis.

Moreover, given the conditions of a modernizing economy as outlined above, we believe that our analysis may give an answer to the question of why schism is such a common phenomenon in the USA. As was stated, a new group which split up from a pre-existing one could profit from its potentially higher level of trust. Even though the overall amount of

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6 For a statistical debate about the validity of the Kelley Thesis, see Iannaccone (1996 a, b), Hadaway and Marler (1996), Hodge (1996)
information is smaller, the information available to each member individually might not be reduced by the same amount as the overall amount of information. This effect clearly favours schism in our view.

6. Determinants of Religious Fractionalization in the USA

The causality between fractionalization and economic performance has been subject to various studies, mostly finding a negative correlation (Easterly, 2000). Alesina et al. (2002) provide an empirical cross-country survey on the measure of ethnic fractionalization and its correlation with economic growth. Fractionalization, in their survey, consists of ethnic, linguistic and religious fractionalization. The major result concerning our underlying question is that fractionalization seems to have a negative impact on the growth of the economy, at least ethnic and linguistic fractionalization. Religious fractionalization has the opposite effect (Alesina et al. 2002, p. 11). However, quite different from our intention, the authors set up a link to tolerance of the underlying society. They state that “a higher observed measure of religious fractionalization can be a sign of a more tolerant and democratic form of government” (p. 11f) and suppose that “observed religious fragmentation is larger in more tolerant countries.” (p. 14).

One channel through which fractionalization may effect growth and the level of income is, e.g., via the quality of government and institutions (Alesina et al. 2002, p. 12). This argument is extended by La Porta et al. (1999). They find a systematic correlation between Protestantism, Catholicism and Islam with the quality of government. According to their analysis, predominantly Protestant countries have better governments than either predominantly Catholic or Muslim countries (La Porta et al. 1999, p. 265). However, the authors regard religion as a proxy for culture (La Porta et al. 1999, p. 264, p.229), therefore pointing to a somewhat different aspect than we are.

Inspired by these findings, we conducted a panel data study investigating the main determinants of fractionalization for fifty states in the United States for 1971, 1980 and 1990. The number of the denominations is counted by thousands and it is almost impossible to get data for all. However there are some institutes collecting data for the prominent denominations. We obtained the data on member size of the denominations for each state from the American Religion Data Archive. The data set is “Churches and Church Membership in the United States”, and contains statistics by state for different numbers of church bodies, providing information on the number of churches and members. For 1971, fifty-three denominations are included, representing an estimated 81 percent of church
membership in the United States. For 1980, 111 Judeo-Christian church bodies, provides
information on the number of churches and members. The denominations included represent
an estimated 91 percent of total U.S. memberships officially submitted to the Yearbook of
American and Canadian Churches, and for 1990, the data set contains 133 Judeo-Christian
church bodies. This study accounts for 23% more communicant members compared to the
“Yearbook of American and Canadian Churches: 1990”. To get the consistency for the
relevant data in our study, we excluded Judaic organizations and we calculated
fractionalization rates for the total number of members which were subject to these surveys.
Therefore the fractionalization rates do not cover the population as a whole but 80-90 % of
total church members for each period.

Personal income per capita, employment and number of non-farm entrepreneurs were
obtained from the statistics of the Bureau of Economic Analysis (BEA) for each state. The
level of educational attainment is the total fall enrolment in degree-granting institutions by
state for each year and obtained from the National Center for Education Statistics (NCES),

The fractionalization variable (Fract) measures the diversity of the population of a state in
terms of denominations. Following the methodology of Alesina et al. (2003), we measure
fractionalization as one minus the Herfindahl index of denominational shares of all church
members, reflecting the probability that two randomly selected individuals from a population
belonged to different groups. We use the same formula to compute our measures of
fractionalization:

\[ Fract_{jt} = 1 - \sum_{i} s_{ijt}^2, \]

where \( s_{ijt} \) is the share of denomination \( i \) (\( i=1...N \)) in state \( j \) (\( j=1...50 \)) at time \( t \) (\( t=1971, 1980, 1990 \)).

To test our arguments, we interpret fractionalization as a result of reputation enhancing
behaviour of the individuals, and forming new networks to increase their utilities via
signalling effects, as stated in the previous sections. We see reputation enhancing behaviour
as a function of income, educational attainment, population, and the structure of population in
terms of the number of employees and entrepreneurs. We assume that individuals are under
the constraint of their human capital stock for choosing the level of their trust enhancing
interactions. Empirical studies on social networks also show that engaging in non-anonymous
civic activities is determined mainly by the level of income and education (La Due Lake and
Huckfeldt, 1998, Christoforou, 2005). We argue that fractionalization increases in each state
as people gain more resources such as income and education, since the utility from the quality of signalling gets more important. The last two variables are measures for the number of people who are potentially willing to engage in trust enhancing groups. Increasing population is expected to have a positive sign when individuals consider the quality of the signals more important than the amount of information, and vice versa. Another factor determining the effect of population on fractionalization is the behavioural characteristics of the individuals. Akerlof (1997) gives examples how externalities are important either when people try to distance themselves from their relatives and friends in social space as a status seeking behaviour and when they try to move themselves closer as conformist behaviour. Hence, individuals may be status seeking and their utility may decrease as more people access their social network and conversely, individuals may be conformist if the utility of membership grows with the membership size. Obviously, a society is composed of both types of groups. We split the population into two groups as employees and entrepreneurs, the latter being expected to behave more status-seeking.

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dummy for 1971</td>
<td>-1.176</td>
<td>-1.596</td>
</tr>
<tr>
<td></td>
<td>(-3.070)</td>
<td>(-4.744)</td>
</tr>
<tr>
<td>Dummy for 1980</td>
<td>-1.450</td>
<td>-1.893</td>
</tr>
<tr>
<td></td>
<td>(-3.512)</td>
<td>(-5.158)</td>
</tr>
<tr>
<td>Dummy for 1990</td>
<td>-1.643</td>
<td>-2.105</td>
</tr>
<tr>
<td></td>
<td>(-3.757)</td>
<td>(-5.392)</td>
</tr>
<tr>
<td>Log of personal income per capita</td>
<td>0.309</td>
<td>0.360</td>
</tr>
<tr>
<td></td>
<td>(7.454)</td>
<td>(9.232)</td>
</tr>
<tr>
<td>Log of enrolment</td>
<td>0.169</td>
<td>0.171</td>
</tr>
<tr>
<td></td>
<td>(5.313)</td>
<td>(5.686)</td>
</tr>
<tr>
<td>Log of population</td>
<td>-0.174</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-5.496)</td>
<td></td>
</tr>
<tr>
<td>Log of employment</td>
<td></td>
<td>-0.223</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-5.939)</td>
</tr>
<tr>
<td>Log of non-farm entrepreneurs</td>
<td></td>
<td>0.044</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.737)</td>
</tr>
<tr>
<td>R² adjusted</td>
<td>0.46</td>
<td>0.48</td>
</tr>
<tr>
<td>F-statistic</td>
<td>26.68</td>
<td>24.66</td>
</tr>
</tbody>
</table>

Notes: t-statistics are in parenthesis. Estimated using pooled least squares. Number of observations, N=150 for each equation.

Table 1. Panel Data Estimation Results for Denominational Fractionalization (Dependent variable is fractionalization ratio)

The results above indicate an interesting determination of group size and fractionalization. As seen in column (1) above, our analysis yields a negative coefficient for the population variable, suggesting that the fractionalization ratio decreases as the population increases. Adding employment and non-farm variables in equation (2) the coefficient for
employment is again negative, whereas we obtain a positive coefficient for the number of entrepreneurs. It seems reasonable to argue that entrepreneurs rely more on reputation and trust than, e.g., workers\textsuperscript{7}. One possible reason may be the returns from social activities increase with social status, and people with higher status are more willing to participation to smaller networks to be treated more favourably by the priests and other parishioners, so enjoying a better signalling value. The level of educational enrolment and personal income per capita variables both have positive coefficients, suggesting that fractionalization increases as individuals have more resources to involve in network organizations. These results are also consistent with the previous studies explaining the linkage between education, status and religion. Sacerdote and Glaeser (2001) argue that this is a natural result of the general relationship between education and social group membership as there is a strong positive correlation between religious activities and other forms of social activity.

7. Conclusion

There are various examples of religious groups economically outperforming others. Religious activity seems to have been one of the signals used in order to signal being a cooperative type. One of the shared features of these successful groups seems to be their limited size. For instance, the Medieval Maghribi Traders and Genovese Traders analyzed by Avner Greif (1989, 1992, 1993, 1994) or the Protestant Sects, studied by Max Weber (1905) all were of limited size. Leeson (2005) added another name to the list of successfully signalling religions. We believe to have shown one of the reasons for their economic success on a theoretical and empirical basis. Signalling one’s type and the availability of information are two major aspects of trade, even more so if the legal frame or the legal enforcement is poor. However, both signals and the amount of information may be dependent on the size of the respective group. The size of the group then becomes determined by the given economic setting, i.e., which of the two is more important and whether limitations from size can be offset or not.

The empirical results of this study seem to point to the same argument by showing that the diversity of denominations in the United States increases in the states where more people

\textsuperscript{7}The data does not allow us to take the effects of immigration into account since we don’t know the religious structures of the immigrants. If we think that the majority of immigrants come from Latin America, and with Catholic faith, which do not allow different denominations or schism, one can expect even a positive coefficient for population and employment variables when they are excluded. The immigrants seem to form other kinds of networks based on ethnicities rather than denominations. Still, the effect of increasing population does not vanish. However, we regard the population as a whole and we assume that immigrants and local people are potential agents who get and transmit information with each other for both cooperation and competition in the society.
are reliant on “good” signals. We find that the level of income and education attainment increase the fractionalization ratio in the states. Another interesting point in our empirical results regarding population size is that the number of entrepreneurs is positively correlated with the fractionalization ratio. The number of employees gives a negative coefficient, implying that this group prefers to be part of bigger groups due to their conformist behaviour.

Avoiding theological arguments, we regard the main characteristic of religious communities as establishing social networks within the society. Churches and other religious organizations act as an important element of associational activity to connect people with each other in a society. The success of a religion in ensuring community trust within its social network depends on the quality of signalling. This means that providing individual members with the reputation of being trustable, monitoring costs of defection, and therefore limiting free-riding enhances production and allocation efficiencies. We argued that decreasing size of the network is accompanied by increasing quality of the signal, therefore giving one possible explanation to the observations mentioned.

We would like to emphasize at this point, however, that we do not claim that religions are the only, most appropriate or even an efficient way\textsuperscript{8} to organize in such networks. Rather, it seems as if different cultural regions developed different devices to cope with the problem of anonymity. In China, to give only one example, Guanxi, i.e. personal networks of individuals which is used as a quite universal mechanism for the allocation of scarce resources, could be seen as another form of network, evolved in order to (re-)introduce “personal” relationships\textsuperscript{9}. Consequently, we think that all over the world different forms of institutions evolved, making the development of trust possible. In the case of traders in the Medieval Mediterranean and the colonization of America, religious sects may have played this role. We therefore explicitly exclude cases like the religious groups in Asia or other parts of the world, although there seems to be evidence that even rather ascetic religions like Hinduism do not per se hinder economic activities and the pursuit of monetary gains\textsuperscript{10}.

Under the light of arguments above, we also do not see a clear direction between fractionalization and bad institutions to create economic deterioration. Fractionalization, in our view, can be seen as a response to structural changes in the market which decreases

\textsuperscript{8} Inefficiencies may result, e.g., when potentially beneficial exchanges are not considered for ideological reasons.

\textsuperscript{9} Guanxi can be defined as “the relationships that an individual maintains in social networks”. (Knight, J., L.Y. Yueh (2002, p. 5))

\textsuperscript{10} Uppal (1986) finds statements supporting economic gains in the Panchatantra, a gathering of fables, sayings and stories from hinduistic India dating back to 400 B.C. E.g., “wealth gives constant vigour, confidence and power” and “poverty is a curse worse than death”.

\textsuperscript{11}
transaction costs, thereby facilitating cooperation among individuals. However, institutional structures of societies are the main determinant to create both harmony and conflict among fractionalised groups. In centralized institutional structures, it could be more likely to observe conflict since there is potentially a severe competition for reaching the spearhead of power. De-centralised organizational forms of institutions on the other hand may soften this competition and positive elements of the social networks may prevail.

References:


American Religion Data Archive, “Churches and Church Membership in the United States”, www.thearda.com


