Denominational Schism: An Economic Perspective

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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 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

There has been a vast and controversial debate on the economic effects of religion, and a consensus on the nature of the relationship between religion and the economy has not yet been achieved. Although the debate is mainly limited within the theoretical boundaries of sociology and psychology, there is also a growing tendency to analyse the subject by using the tools of economics (for a detailed survey see, e.g., Iannaccone, 1998).

Many nineteenth-century scholars — including Marx, Freud, and Comte — regard religion and social and economic development as negatively correlated. In his Criticism of Hegel's Law, Marx famously states: "The grounds of the unreligious critique is man made religion, religion does not make man. Religious misery is, by one side, an expression of the real misery. Religion is the exhausted creature's sigh, the state of animus of a heartless world, the spirit of spiritless situations. Religion is the people's opium" (Guiso, Sapienza and Zingales, 2002, p. 8).

On the other hand, Weber regarded positive correlation of religion and economic development as possible. In his classic "The Protestant Ethic and the Spirit of Capitalism" from 1905, Weber attributes the emergence of Capitalism to the development of a Protestant Ethic. Weber's Protestant Ethic results from the interaction of the doctrine of salvation and the concept of good works. According to him, it was Luther who decisively altered the Christian

concept of good works as describing the fulfilment of duties in worldly affairs as the highest form which the moral activity of the individual could assume.

Despite numerous studies challenging the empirical validity of this argument, the Protestant Ethic Thesis lives "as an article of faith in such varied texts as (nearly all) sociology primers, international business textbooks of all stripes, [and] the middlebrow press" (Delacroix 1995, p. 126)

Some authors refute Weber's stylized account of Western economic history, demonstrating that across the regions cited by Weber, economic progress was uncorrelated with religion, or was temporally incompatible with Weber's thesis, or actually reversed the pattern claimed by Weber. We see that he was attacked on all sides by his contemporary colleagues once it was felt that both capitalism and Protestantism had been gravely impugned by Weber's thesis. For instance, Lujo Brentano (Die Anfänge des modernen Kapitalismus, 1916) argued that the Renaissance, the Crusades, and the reception of Roman Law were crucial factors for Capitalism as well. H. M. Robertson (The Rise of Economic Individualism, 1935) and Brentano asserted that Roman Catholicism played a more formative role in the evolution of capitalism than Protestantism. W. Sombart (Jews and Modern Capitalism, p. 249) found the spirit of Capitalism in Judaism, he declared that "Puritanism is Judaism". Numerous studies also indicate that there is no clear linkage between the values of Protestantism and economic prosperity or development. Comparing levels of economic development across the Protestant and Catholic countries of Europe, Delacroix (1992) finds no evidence that one group out-performs the other. Delacroix (1995, p. 126) also observes that Amsterdam's wealth was centred on Catholic families, the economically advanced German Rhineland was more Catholic than Protestant, Catholic Belgium was the second country to industrialize, ahead of a good half-dozen of Protestant entities (Iannaccone, 1998, p. 1475).

Having this historical debate in mind, we focus on one aspect of the most economically successful religious groups have in common. Namely, we argue that it is simply the small size of newly developing or separating denominations that bears an advantage. Group size can play an important role in shaping an individual's choice to engage in cooperative behaviours. Members of small groups are expected to cooperate more than the members of large groups, since an individual's identifiability and sense of shared responsibility is higher in small groups. Moreover, the signals one can receive about the trustworthiness of others are assumed to be of better quality in small groups than in large ones, making potential exchange relations more predictable, thus reducing transaction costs. Schism reduces the size of a religious group. In order to avoid theological argumentation of the sort stated above, we will interpret

religious groups as networks. These networks, in our view, may be an institutional arrangement to improve coordination by increasing trust. Changes in the economic environment may make trust more important. An increase in the amount of trust within a religious network might be a possible result of schism, leading to better economic outcomes as well.

We will try to make our point clear by briefly presenting some sociological and psychological explanations for schism in the next section and pointing towards the interrelation of schism and the economy in section three. A formal model of our intuition will be presented in section four, followed by empirical findings supporting our argumentation. Concluding remarks will close the paper.

2. Explanations for Schism

Since religion is mainly a sociological and psychological aspect of life, schism has mainly been explained by these sciences. In the following, we will try to give a brief overview some of the arguments brought up so far.

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).

2.1. Sociological Explanations

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 pre-existing 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 is schism to occur.

2.2. Psychological Explanations

In the psychological theory, religious schism is mainly related to deprivation[1]. According to the deprivation theory, people will want to split from an existing form of denomination whenever they feel deprived relative to what they expect from the "church" (see, e.g., Spilka et al. 1985, p. 233). Depending on the cause of deprivation, the resulting denominational subgroup will have a different "content". As Spilka et al. (1985) state, "Glock argues that economic deprivation leads to the formation of religious sects while physiological deprivations lead to the formation of religiously rooted healing movements" (p. 235). Quite interesting is the fact that psychological arguments seem to indicate growing social conflict by an increasing number of schisms. Spilka et al. (1985) "would expect new religious movements to create controversy since, whether emerging within organized bodies or from anew, they are likely to be in tension with their surrounding environment." (p. 239). This seems to be a quite different argument from the one brought up by sociology, where, as stated above, tensions within a denomination will lead to schism.

Deprivation Theory, in our view, might relate the economic circumstances to the number of denominations. According to this theory, "all religion is seen as a response to what in the absence of this response is deprivation." (Spilka et al. 1985, p. 234). The quotation of Marx,

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[1] The same argument is brought about for the case of conversion. See, e.g., Hexham and Poewe (2000)

mentioned above, clearly sets him into this line of theory. Moreover, it connects the "importance" of religion to the economic conditions, whereas other authors make one step further towards relating the number of denominations to economic conditions. As Spilka et al. (1985, p. 238) state, "one might anticipate that new religious organizations arise in periods of crisis precisely because new solutions to issues are needed that in fact also partly account for the existence of the crisis. In this sense, religious organizations represent collective efforts at resolutions to life's riddles, however recognized or defined." In our view, this definition of "crisis" includes economic crisis, thereby referring back to Marx. This would mean that the number of denominations would be negatively correlated to the economic situation of the economy; if the economy is flourishing the number of denominations either declines or remains constant, if the economy is in recession the number of denominations will increase.

But on the whole, psychology, in our view, mainly tries to understand the content of the religious movements or why people join religious groups at all.

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).

The findings of Liebman et al. and Sutton and Chaves present a major basis for our model which we will present in section four. But before, we will try to provide a deeper reasoning for the connection of the economy and division of social entities, of which religions might be seen as part of.

3. Networks, Fractionalization, Schism, and the Economy

Given this diversity of explanations for denominational schism, we will focus on the organizational explanation. In the following we will try to make clear that the organizational structure may partly be determined by economic factors. Therefore, we see our explanation in the line of external influences on schism, as described by Sutton and Chaves (2004).

North (1994) states that economic success requires appropriate institutions. Accordingly, "successful political/economic systems have evolved flexible institutional structures that can survive the shocks and changes that are a part of successful evolution." (p. 367). Our argument is that religious networks can be seen as such flexible institutional structures. They allow to overcome the coordination problems inherent in big, anonymous markets by facilitating communication about the others' willingness to cooperate, therefore reducing anonymity and thus making the evolution of trust possible. Transaction costs between network members can then be reduced, giving them a comparative advantage over larger-scaled, relatively anonymous networks.

But before continuing with our argumentation it seems reasonable to define what we have in mind when talking about networks in order to avoid confusions resulting from different conceptions of networks.

3.1 Defining Features of Networks

There are various definitions of what is understood as a network. We will not try to give a repetition of all these definitions or even enlarge the set of definitions. Rather, we will try to find out some common features of the different understandings of what networks are. Moreover, as we only deal with "human networks" in contrast to, e.g., computer networks, we will try to focus on the specific features of these personal forms of networks.

According to Ansell (2000), people form a network in order to exchange something. This "something" is not specified but rather diffuse. Mostly it is not only one thing that is exchanged but different things at different points in time. Moreover, the exchange takes place

in a rather social manner than in an anonymous manner, i.e. the "person" with which things are being exchanged plays a role. These characteristics distinguish networks from markets.

Networks are furthermore structurally characterized as "heterarchical" rather than hierarchical. This means that every network member is connected with numerous others. In contrast, a hierarchical system is characterized by "one-to-many-connections" between the members, where many subordinates are connected to one superior who might in turn be one of many subordinates to another superior and so on.

Ansell (2000) distinguishes another characteristic of networks which mostly refers to organizations as networks. He states that they are organic rather than mechanic. This is to say that "[t]he brains […] are decentralized and distributed, and coordination is achieved more through mutual adjustment than through command and control." (p. 306)

We believe that religious denominations share all these features. Concerning the heterarchical structure, we will only refer to the "subjects" of a religion, meaning the "people attending the services", as opposed to the formal authority structure.

In the following two subchapters we will try to show how fractionalization or network formation may affect economic outcomes. Some historical examples are then presented, indicating a major role of religious networks for economic success in these cases.

3.2. Fractionalization and 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 tends to increase, even if no increasing costs per transaction are assumed.[2]

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[2] 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

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 share this information by providing 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. Kranton (1996) showed in her model that path-dependencies can occur, meaning that if a large portion of people engage in networks, the market solution will not evolve to the same amount, especially if the legal framework for the market is not extensive enough. 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.

Especially the factors trust and networks point to the issue of social capital. As Schuller et al. (2000, p. 14) state, "[a]cross the diverse social capital literature, trust and networks are taken to be two key component terms of the concept." Though the term is not commonly specified, most definitions refer to "the glue that holds groups and societies together – bonds of shared

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that the re-emergence of personal transactions might be a substitute or complement for impersonal contract enforcement (Schaefer and Ott, 2004, pp. 355-374).

values, norms and institutions" (Narayan 1999, p. 1) as social capital. Among the positive effects of social capital is the evolution of trust that might appear. This may lead to a reduction of transaction costs within the group. Due to, e.g. self-attribution, trust may even transcend the borders of the network within which it originally evolved by the interaction of the members of the network with other people. Very briefly[3], self-attribution theory states that people try to explain their behaviour to themselves in the "easiest" way. Accordingly, one might explain trusting behaviour either by pointing to the various advantages one might have from it. Or one could simply assume that one is a person willing to trust others easily. Since the latter seems easier to understand, in general, this would be an appropriate explanation. But as one regards himself as "trusting" person, he would act trusting in other situations as well. Trust can therefore spread to various activities, independent of the actual incidence where it evolved for the first time.

This could be an explanation for the phenomena observed by Putnam (1993). The main point is that "norms and networks of civic engagement also powerfully affect the performance of representative government" (Putnam 1995, p. 66) and may thus have a positive contribution to the economic performance of a country. Accordingly, religions may be one opportunity for establishing such a network. There seems empirical evidence that trust in smaller networks is easier to evolve, as La Porta et al. (1997) showed on an empirical basis. On an experimental basis, Carpenter (2004) was able to show that group size might matter, contrasting with the traditional view that punishment will not deter free riding, regardless of the size or structure of groups because in sub-game perfection costly punishment is not credible. His research shows that by taking seriously the behavioural heterogeneity seen in the experimental lab, group size may hinder the ability of norm enforcing agents to catch all the free riders before their contagious behaviour affects the entire group. He also argues that the simulations and experiments show that the logistics of large groups may hinder the ability of mutual monitoring to discipline free riders as it becomes more difficult for each member to keep an eye on all the other members. Isaac and Walker (1998) examine the relationship between variations in group size and free riding behaviour in the voluntary provision of public goods. They examine experimentally two different concepts which are the marginal return to an individual from contributions to the public good, and the actual number of members in the group. Their results support a hypothesis that increasing group size leads to a reduction in allocative efficiency when accompanied by a decrease in the marginal return from the public good. J. A. Wagner III (1995) also finds that group size and individuals' identifiability, sense

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[3] For a more detailed description of the self-attribution theory, see, e.g., Schlicht (1998), pp. 119-128.

of shared responsibility, and levels of individualism or collectivism influence cooperation in groups in such a way that the members of small groups cooperate more than the members of large groups, indicating that group size plays a role in shaping an individual's choice to engage in cooperative behaviours, and thus limits free riding.

3.3. Religious Networks in History

What distinguishes religious networks from other forms of networks is that their number can be measured rather easily and that the enforcement mechanisms inherent are, at least in our view, stronger than in some other forms of networks. Adam Smith probably was the first who claimed religious sects as important for monitoring and creating reputation which is essential for trust and cooperation within social networks. In *The Theory of Moral Sentiments*, he noted that one of the most economically significant functions of religious beliefs was to provide strong incentives to follow moral structures that helped to support civil society, that is, e.g., honesty, benevolence and restraint from violence. The belief in God or some other "higher spirit" constitutes a kind of internal moral enforcement mechanism. The cost of external monitoring of every individual's behaviour all the time is extremely high. Religion provides the basis for a system of internalized monitoring that represents an efficiency-enhancing adaptation to this problem. It might be possible that this internal monitoring is anticipated by other members of the network in the form of a signal about the type of other network members. This line of argumentation is far from being new. According to Irons (1996) the primary adaptive benefit of religion is its ability to promote cooperation and overcome problems of collective action that humans have faced throughout their evolutionary history, including cooperative hunting, food sharing, defence, and warfare. When faced with the conditions of collective action, the incentive to claim falsely that one will cooperate is especially high because individuals can achieve their greatest benefits by refraining from cooperation when others cooperate.

As a historical example for the role of religion as enhancing cooperation, trust and reciprocity, Greif (1989, 1992, 1993, 1994) refers to the Maghribi traders who were a distinctive merchant group within the Jewish community in the Medieval. He describes the agency relations in that period as characterized by asymmetric information, since the revenues the agent received depended upon circumstances that were not directly observed by the merchant. The legal system was not used to mitigate the merchant-agent commitment problem. He finds that the relations among the Maghribi traders suggest that these relations were based upon mutual trust. Many of the business associations mentioned in the documents were conducted without

relying upon the legal system and many business relations were not based upon legal contract. Astonishingly, only a few documents within thousands reflect allegations about misconduct (Greif, 1989, p.881).

Further historical evidence can be found in America, especially during the early settlements, where the main motivation of the religious communities was the survival of their members in a foreign land. Gardner (1917) shows the importance of cooperation in the early economic history of Utah, cooperative building of irrigation systems, cooperative stores, smaller retail stores, woollen mills, and industrial cooperation. He emphasizes the institutional aspects of church organization in this process and maintains that in near-by states the colonists acted individually and were not connected with each other by any particular interest, while in Utah there existed a compact social body, closely united by common ties and easily capable of being used as a vehicle to cope with general needs (p. 498). This common bond was the peculiar church organization and the religion of Mormon people. Taylor and Arrington (1958) also find that religion supplied such reserves as loyalty and discipline. Such well-conceived and widely accepted institutions as the Mormons were created within thirty years. They explain the process through which the Mormons had established more than 300 settlements, based on irrigated agriculture, and had elaborated all the institutions of a stable community of some 100 000 inhabitants, after facing a wilderness in Utah when they first entered. They argue that the Mormons achieved this by methods which constitute one further example of that interplay of religious and economic aims which is found throughout Utah's early history (p.86). It is that interplay by which, in barren country and in extreme isolation, they worked out a vast colonizing enterprise and, from meagre resources, financed a great migration.

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[4] 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[5]. Consequently, we think that all over the world different forms of institutions developed, 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

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[4] Inefficiencies may result, e.g., when potentially beneficial exchanges are not considered for ideological reasons.
[5] Guanxi can be defined as "the relationships that an individual maintains in social networks". (Knight, J., L.Y. Yueh (2002, p. 5))

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[6].

4. Modelling Different Effects of Network Size

Given the interpretation of religions primarily as networks, one can model different effects of network size. Following the argumentation above, we will focus on the informational aspects, namely the quality of a signal and the amount of information available. The utility of an individual joining a religious group is therefore 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 τ 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" γ if the information is not received from a directly acquainted. As third factor, we identify psychological and sociological aspects, c, which we assume to be constant for the sake of simplicity. This does not mean, of course, that these factors do not play an important role or are necessarily independent from the network size.

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

(1) $$u = u(s, g, c)$$

(2) $$s = s(X, \tau)$$

(3) $$g = g(X, \gamma)$$

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

4.1. The Quality of a Signal

As we have stated above, a modernizing economy is characterized by a growing number of interactions. Therefore, it becomes more and more important to receive signals about a

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[6] 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".

potential trading partner. Reliable signals could 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. The network members meet each other randomly[7]. 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_l of the network whether he knows the type of x_j. x_l will supply some signal q about x_j if he knows him. If this is the case, the informant x_l will correctly inform x_i about the type of x_j with probability τ. However, if x_l 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:

(4)
$$s = \frac{k}{X} + (1 - \frac{k}{X})q$$

$\frac{k}{X}$ 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 τ. 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:

(5)
$$q = \frac{k}{X}\tau + (1 - \frac{k}{X})q$$

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

(6)
$$s = \frac{k}{X} + (1 - \frac{k}{X})\tau$$

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

(7)
$$\frac{\partial s}{\partial X} = -\frac{k}{X^2} + \frac{k}{X^2}\tau = \frac{k}{X^2}(\tau - 1) < 0 ,$$

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[7] It should be noted explicitly that we only allow for matching with members of the network, not with non-members. The question arose whether matching with non-members would change our results. At current, we can only hypothesize that it would, but still stick to our model at hand, since we are mainly concerned with developments within religious networks.

since τ <1. 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. Referring to our underlying question, if a modernizing economy will make people receiving better signals about their potential trading partners better off, a reduction in the size of the network can lead to an increase of the signal value. Therefore, schism may be one consequence of the modernizing economy, as it is associated with smaller religious networks.

It should be mentioned at this point that an increase of the probability that an informant will correctly pass information about an acquaintant, τ, is also associated with an increase of the quality of the signal. An increase in τ can therefore be a substitute for a decrease in size. In our view, this fact is one possible explanation for the so-called Kelley Thesis. 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[8].

4.2. 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

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[8] For a statistical debate about the validity of the Kelley Thesis, see Iannaccone (1996 a, b), Hadaway and Marler (1996), Hodge (1996)

members, faces some loss of γ. One can think of not openly passing information to strangers. Formally, the amount of information available to each member is therefore:

(8) $$g = k + (X - k)\gamma$$

Clearly the first derivative with respect to X is γ and therefore positive[9]. This means that an increase in the network size is associated with an increase in the amount of information available to each member.

Again, an interesting result for the specific case of religious networks is straightforward. As was shown above, the amount of information is dependent on γ, 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 denomination which split up from a pre-existing one, could 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. This effect clearly favours schism in our view.

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.

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[9] 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 γ only.

5. Empirical Findings

We see that there is empirical evidence for our hypothesis that economic success and the number of denominations correlate in a positive way. 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 provided

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), Digest of Education Statistics (2003).

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:

$$Fract_{jt} = 1 - \sum_{i}^{N} s_{ijt}^2 ,$$

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

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

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

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[10]. We therefore regard this finding as supporting our theoretical arguments that reputation and trust are two of the driving forces for schism and group size is an important determinant for both status seeking and conformist individuals, yet in different ways.

The level of educational enrolment and personal income per capita variables both have positive coefficients, suggesting that schism and fractionalization increase as individuals have more resources to involve in network organizations. Two reasons may drive these results. On the one hand, engaging in social networks can be regarded as costly, at least concerning time. Therefore, only people with enough resources can afford to join these networks. On the other hand, people with higher education may aim at jobs combined with more personal contacts at work. Therefore, these people may try to build up reputation or signals of high quality of their type besides their educational signals. Since they benefit from this investment more than other workers, they may be willing to invest more than the latter.

6. Conclusion

The terminologies of "social capital" and "community governance" mainly emphasize special features of social organizations, such as trust, norms, reciprocity and reputation. It is commonly stated that these features can improve the efficiency of society by facilitating coordinated actions and enhance voluntary cooperation. However, to benefit from positive effects of social networks, e.g., of increasing potential costs to a defector in individual transactions, fostering robust norms of reciprocity, or facilitating communication and improving the flow of information about the trustworthiness of individuals, social networks have to limit their size. Experimental game theory suggests that rational cooperation is ensured if short-term benefits from opportunistic behaviour are off-set by the long term costs of sanctions imposed on the culprit. Moreover, members of small groups cooperate more than the members of large groups, indicating that group size plays a role in influencing an individual's choice to engage in cooperative behaviours. 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 are reliant on "good" signals. We find

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[10] 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.

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.

Putnam (1993, p. 173) argues that any society - modern or traditional, authoritarian or democratic, feudal or capitalist - is characterized by networks of interpersonal communication and exchange, both formal and informal. Protestantism, different from other religions, does not have a hierarchical system that unifies in one organization. This institutional tradition allows denominational and sectarian organizations which have played a role for community governance throughout the history since the Reformation, and especially in the colonization of America. It is possible to argue that if it is not the "Protestant Ethic" that fostered economic success in the Protestant countries, it could be the "Protestant Schism" which allowed more community governance. Trust can dramatically reduce both transaction costs – replacing contracts by handshakes – and agency risks – replacing the fear of shirking and misrepresentation with mutual confidence. This can greatly mitigate the coordination difficulties, where it is almost impossible to have perfect contracts. Therefore, the schism mechanism can play an increasing role in the society as providing self-adaptive institutions for the needs of the knowledge economy requiring more and efficient information.

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