

Mangeloja, Esa

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Interrelationship of economic growth and regional religious properties

Esa Mangeloja

University of Jyväskylä, School of Business and Economics,
P.O.Box 35, FIN-40014 University of Jyväskylä, Finland.
Tel. +358-50-3686858, fax +358-14-2603331
E-mail: eman@econ.jyu.fi

Abstract:

During the past few years, empirical economic growth modeling has emerged by constructing and testing numerous model and explanatory variable alternatives. One of the most promising recent idea consists that also religious aspects should be included as explanatory variables into economic growth models, therefore capturing influences of culture, moral and ethics. Moral institutions and ethics affect the economic development, as for example, trust and honesty are essential requirements for emerging economic activity. In this paper, analysis of economic growth extends from international to regional level. Religious activities and beliefs are documented over a long time period in many Western economies, making quantitative empirical time series data available. Firstly, following the idea and argumentation by Barro and McCleary (2003a, 2002), “religious production efficiency” measure is constructed and used in economic growth regressions for 8 OECD countries, proxying quantifiable dimensions of culture. By using panel estimation methods and additionally time-series estimations for each country, rather than usual cross-country regressions, more information is gained concerning the country specific growth and religion characteristics. Empirical evidence from the panel data estimations seems to suggest that religious beliefs attain more relevance than religious attendance. Religious production efficiency, containing both belief and activity aspects, was not found statistically significant with panel data or with individual 8 OECD countries growth model, except for Finland. Significant coefficient for Finland can be explained by referring to Finland’s unique religious market properties, as the level of religious beliefs have historically been unusually high, and continue to be, in Finland. Secondly, interrelationship of Finland’s religious and economic variables are analyzed in regional level. Three small Finnish cities, all with strong religious Christian revival background, gain positive and significant coefficients when consumer income growth is regressed by religious activity. Nevertheless, more exact understanding on the links between these concepts are essentially needed to better model the economic consequences of cultural, religious and moral variables. Therefore, several suggestions are presented to gain better growth information in the future empirical growth modeling, including better theoretical background, more robust estimation techniques and longer data.

1. Introduction

Explosion of research on economic growth has improved the outcomes of empirical growth models. Nevertheless, more accuracy is needed, because the gap between theoretical growth models and their empirical evidence remains still pretty wide. Economic scrutiny needs to simulate models and empirically analyze their predictions to real-world data, as is emphasized by Klenow and Rodriques-Clare (1997). Mysteries of data generating process of economic growth remain unsolved. The Summers-Heston type of data has been extensively mined and the growth scholars are experiencing kind of “regression fatigue”, but the researchers continue to show some ingenuity in finding new and interesting variables to combine with the data set. There is a routine call for more detailed studies of individual country experience (Temple 1999).

Robert J. Barro and Rachel M. McCleary (2003a, 2002) have argued that economic growth depends on religious activity of the economy’s consumers. The most interesting result is that economic growth depends on the extent of religious believing relative to belonging. They define the productivity of the religion sector to be the level of belief expressed relative to attendance in religious activities. According to Barro and McCleary, religious beliefs are positively related to economic growth and negatively to church attendance. Patterns remained intact when instrumental variables to control for possible reverse causation were used. That kind of growth modeling, sometimes known as “Barro regressions”, means using a more or less *ad hoc* regressions, driven in its specification mainly by previous results in the literature.

According to Barro and McCleary, the current state of economic growth analysis is such that explanations of economic performance have to go beyond narrow measures of economic variables to encompass political and social factors. The empirical growth research reveal important influences on growth from policies and institutions. Economic growth models should also include variables for nation's culture, moral and ethics (Barro 2000). Probably the best proxy for that is religion, as it is well documented for a long time in many Western economies, making quantitative empirical data available and measuring quantifiable dimensions of culture.

Based on the previous economic growth models (as Barro 1997), in studies by Barro and McCleary (2002, 2003a) the growth rate of per capita GDP is analyzed by using religious variables as explanatory variables. Their most interesting finding is that religion seems to affect economic growth (but not the other way around). In Barro's growth model, coefficient on church attendance was significantly negative, whereas that on beliefs was significantly positive. The implication is that the main growth effect is a positive response to an increase in religious believing *relative* to religious attending. This finding is understandable if believing is seen as the fundamental output of the religion sector. Economic growth is then positively related to the productivity of the religion sector in the sense of the level of belief expressed relative to sector inputs, which include the level of church attendance. The analysis supports the notion that an increase in religious beliefs or a decrease in church attendance tend to stimulate also economic growth.

The purpose of this study is to test the claim made by Barro and McCleary by using time-series data, panel estimation methods, and extend the analysis to individual country level (by using data from 8 OECD countries) and further to regional and individual municipality level. Panel estimation results find some support for the notion that the strength of religious beliefs affect positively the economic growth. Additionally, in the countries with strong religious bases (USA, Spain, Finland), religious beliefs and religious attendance variables seem to support the hypothesis of Barro and McCleary that religious beliefs affect positively and religious attendance activity negatively the economic growth. Nevertheless, this study failed to find wide support for the idea of "religious production efficiency" measure, suggested by Barro and McCleary. The religious efficiency variable was found statistically significant only for Finland among the eight countries tested.

Analysis is then extended to regional level in Finland, which was found to be the most interesting region in respect to interrelationship between economic growth and religion. Time series church membership data is used to scrutinize the connection of Finnish religious environment with economic variables. Membership data of Finnish Free Church is used as an explanatory variable when modeling per capita income growth in 61 municipalities in Finland. Church membership growth is found to be significant in panel estimation and especially in three small cities. Religious factors seem to have potential for supporting economic growth, if its influence can effect the society widely. Better understanding on the theoretical model and the logic of influences, in addition to larger

data base, is required for better understanding on the interrelationships between economic growth and religion.

2. Discussion on the role of religion on economic growth

One of the founding writings on the economic consequences of religion is Max Weber's "*Die Protestantische Ethik und der Geist des Kapitalismus*", where he argues that the Protestant Reformation made possible the advance of modern capitalism. Protestantism made a previously unseen emphasis on individual responsibility, personal diligence and approved risk-taking and financial self-improvement (Weber 1904). Nevertheless, there is mixed empirical evidence backing the Protestant Ethic thesis. For example, it has been shown¹ that most capitalist institutions preceded the Protestant Reformation. Some also argue, that during the beginning of modern capitalism, economic progress in Europe was uncorrelated with Protestant religion, in a sense that in Netherlands, Catholic families had more wealth than Protestants. Nevertheless, several scholars² note that Christian religion overall has enabled rapid economic growth, versus the economic and intellectual development in Islamic countries for most of millennium. This is explained to depend on Islam's static world-view. Numerous scholars continue to emphasize especially Protestantism as being positively correlated with growth and development (Grier 1997). It should also be remembered, that the empirical evidence only rejects the specific channel proposed by Weber (Guiso, Sapienza & Zingales 2003), not a more general link between the Protestant ethic and the development of a capitalist attitude.

Weber's (1904) main thesis was that religion may be a significant positive or negative force on economic development. The effect would be positive if religion looked favorably on the accumulation of material wealth, perhaps in conjunction with rewards obtained in an after-life. This argumentation could fit into Calvinist Protestantism. Weber argued that the Protestant ethic is inherently about applying religious meaning to economic behavior, as for example, labor was seen as a moral duty. However, as Keely notes (2003, p.286), Weber otherwise downplayed the role of religious beliefs in determining economic

¹ Samuelsson, K. (1993), Anderson, and Tollison, R., (1992), Delacroix, (1992), Tawney, R.H., (1926)

² Greif, A. (1994), Kuran (1997), Kuran (1995), Chiswick, B. (1983)

performance. He claimed that capitalism did not rely on the Protestant ethic, but rather needed only the initial push of the ethic and afterwards any work ethic remaining is devoid of religious meaning.

Hansmann and Millendorfer have argued that especially Protestant Christian value system produces serious labor involvement and economic efficiency, deriving from an ethic of discipline, self-denial, hard work and systematic planning for the future. Conversion to Protestantism has meant a profound cultural revolution (Hansmann 2000, Millendorfer 1984). The logic of the assumed positive effect mechanism is that a cultural trait affects certain values or beliefs, and those beliefs in turn influence one's economic decision-making and thus economic outcomes. The possible association of cultural factors (religion as a proxy with good data resources for empirical analysis purposes) with differences in economic performance is assumed.

Religion can also increase economic development by promoting a positive attitude toward honesty. Religion may increase levels of trust and reduce levels of corruption and criminal activity, increase a nation's openness to strangers and thus make the economy more open to foreign investments and employees. Religion may encourage thrift, which would stimulate saving, investments and therefore economic growth. At the same time, religion may lead to better health levels (by discouraging "sinful" activities as drugs, over-eating, gambling, alcohol, etc.). Higher health levels in the society would raise productivity through labor force efficiency.

Adam Smith noted in his *Theory of Moral Sentiments* that religious beliefs provide strong incentives to follow moral structures which support economic growth. A concept of supreme being constitutes internal moral enforcement mechanism and a system of internalized moral monitoring (Anderson 1988). Cosgel and Minkler have suggested that the concepts of integrity, commitment and identity help to understand the religious behavior and its consequences. Religious behavior serves as a communicating and signaling device of individual's identity and commitment (Minkler and Cosgel, 2004).

Negative factors could be religious restrictions on capital accumulation, profit-making, credit markets and interest. Religion may also increase resource allocation towards church activities (cathedral building) and therefore removing resources from free market activities.

Violent behavior or civil unrest may either increase or decrease because of religion. Several fundamental Christian beliefs seem also to contradict the values and morals of modern capitalism and secular economics³, as argued by Beed and Beed (1996).

At the same time it has been found that at the microeconomic level of individuals and households, economic behavior and outcomes do correlate with religion. Even more stronger links exist between religiosity and a wide range of economically relevant social behavior, such as criminal activity, drug and alcohol consumption, physical and mental health, marriage, fertility and divorce. US Jews have an average significantly higher wages and income as Christian population, largely due to their high levels of education⁴. Brenner and Kiefer (1981) argue that in response to long-continuing persecution, Jews emphasize the value of education, as it is portable and non-expropriable versus land or physical capital. Chiswick (1983, 1985) notes that Jews acquire high levels of education because of their high rate of return on schooling. This high rate of return is due to large investments in child quality, seen in small family size and mothers' tendency to stay home when raising children. Also Guiso, Sapienza and Zingales (2003) find out that religious beliefs, especially Christian religion, are positively associated with attitudes conducive to economic growth, free markets and better institutions. On the negative side, religious people are found to be more intolerant and less sympathetic to women's rights.

Religious effects on economic behavior are found to be substantively large and statistically significant (Iannaccone 1998, pp.1475-1476), but the possibility remains that religion's statistical effect is spurious. There exists underlying characteristics that form both religious and other activities. Well-behaving children may avoid drugs, stay in school and go to church. People with liberal values will probably stay away from conservative denominations. Nevertheless, there exist plausible *a priori* arguments for religion's impact. Freeman (1986) has noted that churchgoing positively affects the allocation of time, school attendance, work activity and the frequency of socially deviant activity (crime, drugs, alcohol) and that at least some part of the churchgoing effect is the result of an actual

³ During the last centuries, the continuing debate has been whether economics can be seen Christian or non-Christian. The debate can be traced back to at least Engels, F. (1844), who wrote "our economics is essentially Christian".

⁴ Chiswick, B. (1983), Chiswick, B. (1985)

causal impact. Several other economists⁵ have observed significantly lower rates of violent and nonviolent crime in geographical areas with higher rates of religious membership.

There exists a large empirical literature on the relationship between religion and different forms of sociological deviance⁶ (including crime, suicide, divorce, drugs, non-marital sex, etc.). Typical result from these analyzes is that youth raised in highly religious homes are less likely to engage in criminal activity, use drugs or alcohol, or engage in premarital sex. Effects are found to be especially strong for children raised in strict denominations or religiously homogenous communities. Empirical studies consistently find that high rates of religious activity and commitment are linked with mental health, reduced stress and increased life satisfaction. Religious effects seem to persist even after controlling the models for age, income, gender, education, etc. Several epidemiological studies on statistically significant religious effects are reported in several medicine journals. Members of strict religious groups (Mormons, 7th Day Adventists, etc.) seem to enjoy longer lives and lower rates of cancer, stroke, hypertension and heart disease, because they follow several health-related every-day restrictions. Broader correlation between health and religiosity have many causes, including a negative link between faith and stress, or a positive link between church involvement and social support⁷.

A significant relationship between religion and economically relevant behavior does not straightforwardly imply similar relationship between religion and economic attitudes. The degree of religiosity is not found to influence consumer's attitudes concerning capitalism, socialism, income redistribution, private property, free trade and government regulation. Every religious tradition and sacred literature seem to contain enough ambiguity to justify any number of economic positions. Iannaccone (1998) notes that despite media hype concerning the conservatism of the "Religious Right", opinion polls consistently find that the economic attitudes of those groups are no more conservative than those of other Protestants. On several dimensions (income re-distributions, aid to the poor) they are significantly less conservative than the average American. Their conservatism is expressed

⁵ Lipford, McCormick, R. and Tollison, (1993)

⁶ for a good survey on literature, see (Iannaccone1998, p.1476-1478).

⁷ Levin, J.S. (1994)

in a set of theological, moral and social issues (school prayer, abortion, sexual conduct), but which are independent of their economic attitudes.

Religions economic impact seems to be significant, but not uniform. Religion affects strongly some behavioral outcomes. Life satisfaction is related to levels of religious belief and physical health and deviance is strongly related to levels of involvement. On the other hand, religious activity has no uniform or equally strong effect related to some other variables (earnings, education, economic attitudes). Many effects vary across denominations, which are usually strongest in sectarian groups. This lack of uniformity is seen as a proof against spurious correlation due to any simple form of omitted heterogeneity. Religious effects do not reduce to a single unobserved factor, such as goodness, conservatism, credulity or risk aversion, which implies a need for more sophisticated models of religious behavior and economy (Iannaccone 1998, p.1478).

3. Theoretical considerations and methods

Theoretical background in this paper follows standard neoclassical endogenous growth models, as Romer (1990) and Jones (1995a), also following the argumentation used by Barro (1990) and Romer (1990), which essentially are outgrowth versions of Ramsey-Cass-Koopmans type of growth models. The product function is of type:

$$Y = K^\alpha (AL)^{1-\alpha} R^{1-\alpha} \quad (1)$$

Only alternation here is R, which denotes the influence of an economy's religious sector on the productivity of economy. Influence of the religious sector R, is assumed to be the product of three factors

$$R = f(\tau, \omega, S_r) \quad (2)$$

Where τ is time devoted to religious activity, namely religious attendance, and ω consists the religious beliefs held by the representative individuals. The stock of "religious capital" S_r assumes religious consumption to be accumulating, so that past religious experience accumulates religious capital. Individual households are assumed to maximize utility, which is derived from R, in addition to consumption and leisure.

$$\text{Max } U = u(c, (1-l), R) \quad (3)$$

In equation (3) l denotes time used for working and c consumption. Religious capital is assumed to remain in initial condition, zero. Explicit functional form of R is assumed by Barro and McCloskey (2003a) to be the relation between religious beliefs and religious attendance.

$$R = \omega / \tau \quad (4)$$

This testable relation implies that $\tau < 0$ and $\omega > 0$. Production and output is reduced by increase in τ , which is assumed to be third alternative in addition to leisure and work. On the other hand, ω is assumed to contribute positively to R , which proxies the moral and ethical institutions of the society which support the emerging economy.

Contemporary growth theory implies several types of empirical models to be used in explaining real per capital GDP growth. Various alternative variables were considered for the final estimated model, using argumentation of previous growth literature. Table 1 presents the final explanatory variables used for explaining the economic growth rates, some of the most important previous studies using that variable and the assumed signs of the coefficients.

Inclusion of population and population growth is derived from the family of simple Solow-Swan growth models, where labor growth is one of the most important explanatory variable. In those older studies (Solow (1956), Mankiw, Romer, and Weil (1992)), negative association between economic growth and population growth were usually assumed, but further empirical evidence remains controversial (Temple 1999, p.142). Endogenous growth models with R&D sectors, as Romer 1990, emphasize the possibility of positive relationship between population and economic growth. Therefore, the signs assumed for population growth and the level of population are ambiguous.

New growth models with the endogenous growth option, usually include fertility rate as explanatory variable. That is sometimes substituted for using either mortality rate or life expectancy variables. Importance of fertility rate for economic growth has been emphasized especially by G. Becker (see f.e. Becker, Glaeser, Murphy (1999) and Becker (1988)). In this study, fertility rate was found to have the strongest statistical significance compared to mortality rate or life expectancy (they also have high correlation), and they

are omitted. Variables for schooling enrollment and educational attainment implies modeling the human capital measure.

Several macroeconomic variables are included. Investment ratio (the ratio of real gross domestic investment to real GDP) and ratio of public to total investment should contribute positively to economic growth, while government expenditure is assumed to substitute private investment and consumption and affect negatively to economic growth. Inclusion of inflation measure is strongly recommended in literature, as early as in Balassa (1964). Large inflation and variability in prices are causing uncertainty in the economy, reducing investment demand and economic growth. Extent of foreign trade and international openness is assumed to contribute positively to growth and is modeled by using a variable which summarizes export and import activity in relation to GNP. Initial level of GDP is usually added to gather convergence information in cross-country studies. Lower levels of initial GDP imply more rapid growth until the steady-state growth is attained. This idea traces back to Baumol (1986), which gained strong results supporting convergence, the result later criticized by De Long (1988) for spurious data formulation. In this study, initial GDP level was not used, but dynamic panel models are estimated by using one-period lagged economic growth rate as explaining variable.

One fully unsolved methodological problem in empirical growth analysis is the choice between cross-country, panel and time series econometric model. While the use of cross-country data is the most common type, it contains severe estimation problems, which are well summarized in Temple (1999), including parameter heteroscedasticity, difficulty of unobserved fixed effects, outliers, measurement errors, endogeneity, error correlation, model uncertainty and regional spillovers, just to name a few. Therefore, the standard errors in most growth regressions should be treated with a certain degree of mistrust (Temple 2000).

A promising alternative is to use panel data methods, which allow one to control for omitted variables that are persistent over time. By moving to a panel data framework, unobserved heterogeneity can be controlled. Nevertheless, some severe problems remain, as the finite sample properties of most dynamic panel data estimators are not yet well understood. There are also worries about the use of fixed effects specifications, as panel

data modeling usually use fixed effects approaches to analyze the effects of variables that are fairly constant over time, or that will affect growth only with a long lag.

Standard transformations are likely to exacerbate the problem of measurement errors, at least if these errors are not persistent. They typically lead to a large fall in precision, since in effect the between country variation is thrown away.

In this paper, it is argued that growth research should go further than using panels. Standard cross-section methods throw away useful information, while panel data methods make unjustifiable assumptions about parameter homogeneity. Instead, country parameters should be estimated separately using time series regressions for each country. Jones (1995) is one good example of that kind of new emphasis on empirical growth analysis.

Using time-series data in growth analysis brings other problems. The limited timespan of the available data makes it difficult to discern the long-run effect of variables like inflation. This means that the short-run variation in growth rates may be dominated by business cycle effects, not by changes in fundamental long-run growth prospects. The annual data used in this paper covers the years 1971-2001, which limits the degrees of freedom in regressions, and eliminates the use of a long lag structure.

4. Empirical results

The international data consists values for religious production efficiency and real GNP growth rates for thirty years and forms a balanced panel. The real GNP data is from OECD annual statistics and religious variables are constructed from the continuing series of World Value Survey (WVS). Data includes time series for 8 OECD countries (USA, Germany, Japan, Spain, Finland, Sweden, Norway and Denmark), gathered for period 1971-2001. Regional data from Finland includes data from 61 largest cities. Economic variables used include per capita taxable incomes and population from time period 1977-2002 and are gathered from the Finland's Altika data bank. Religious activity in these 61 regions is modeled by using Finnish Free Church membership data covering the same time period.

The panel models were estimated first by using dynamic panel data estimation techniques, namely fixed-effects (within) one-step GMM estimation and country-specific estimations were done by using time-series SUR-estimation technique. Fixed effects panel model was chosen over random effects model by applying Hausman tests.

The final specification of estimated international growth system has the following form:

$$\begin{aligned} \Delta GNP_{i,t} = & \alpha_i + \beta_i \times \text{lagged } \Delta GNP_{i,t} + \chi_i \times \text{population}_{i,t} + \delta_i \times \Delta \text{population}_{i,t} + \phi_i \times \text{fertility}_{i,t} \\ & + \varphi_i \times \Delta \text{prices}_{i,t} + \gamma_i \times \text{high} - \text{schooling}_{i,t} + \eta_i \times \frac{I}{Y}_{i,t} + \kappa_i \times \frac{G}{Y}_{i,t} + \lambda_i \times \frac{NX}{Y}_{i,t} + \mu_i \times \frac{G}{I}_{i,t} \\ & + \theta_i \times R_{i,t} \mid \vartheta_i \times \omega_{i,t} \mid \rho_i \times \tau_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (5)$$

Descriptive statistics of religious variables constructed are presented in tables 2-4 in the appendix. Table 2 consists descriptions of religious belief variable, constructed by using World Values Survey data on people's belief on the existence of afterlife hell. Mean values of each country variables have a straightforward interpretation, implying that people in the US have the highest percentage value for belief, as 73.3% in the US believe that there exists a place called hell in afterlife. The value is pretty high for Catholic Spain (37.8%). Scandinavian countries have typically been examples of modern secular societies, with low level of religious beliefs, property seen in low levels of belief in hell for Sweden, Norway and Denmark. Finland is clearly different in that context, as it has high level of belief in hell (34.0%).

Religious activity is measured as church attendance at least once a month and descriptive statistics are presented in table 3. All the Scandinavian countries (including Finland) have low levels of church attendance (Finland 12.4%, Sweden 12.7%, Norway 12.9% and Denmark 9.4%), all having decreasing trend. US and Spain are examples of countries with high religious activity, as 53.0% and 42.0% of population attain church monthly, respectively.

When religious production efficiency variable is constructed (relation between believing and attending) Finland gets a high value, which is understandable, as it is characterized by high level of believing versus low church attending activity. Japan seems to have similarly high religious efficiency, but the heterogeneity of Japan's religious market makes the interpretation of its true meaning to be extremely difficult. Germany and Sweden have low

religious production efficiency. Reason for that would be that, Sweden and Germany have both low level of believing (lowest for Sweden with Denmark) and Germany has additionally modest church attendance (large part of its population in Catholic).

Estimation results from panel models are presented in table 5. Most variables suggested by previous economic growth models seem to gain statistical significance, with assumed signs (table 1). When religious activity and beliefs are analyzed separately in panel estimation (Model 2 in table 5), it seems that the extend of religious beliefs are more important for growth. Religious efficiency variable was not found to be statistically different from zero.

Country specific regression results for variables implying religious factors are presented in table 6. Variable for religious production efficiency is significant (t-value 2.44) in 5% level only for Finland. For Finland and some other countries, the coefficient is positive as implied by the argumentation by Barro (2003a, 2002). It should be noted, that all the countries with positive religious efficiency coefficient (Finland, USA, Spain) are known as strongly religious countries. Those countries have the highest rate of religious beliefs (table 1), and USA and Spain have the highest religious attendance rates (table 2). Spain is Christian catholic country, while USA is mainly Christian Reformist Protestant and Finland is Christian Lutheran Protestant.

Religious belief (belief in the existence of Hell) is statistically significant for Finland, Sweden, and Spain. The coefficient for religious beliefs is positive, as suggested by argumentation, for all countries except for Sweden and Denmark. Validity and usability of variable for religious activity seems to be problematic. Its significance and consistency of sign (expected to be negative) remains weak. Coefficient for religious activity is significant and negative for Finland and Spain (positive for Japan).

Explanation for different behavior of Finland's religious variables might be in that Finland has clearly different religious behavior characteristics compared to all other countries. Finland has a long history of strong protestant revivals and that explains why its level of religious beliefs is still pretty high compared to other pretty secular Scandinavian and Northern European countries.

Analyzing interrelationship of economic and religious factors in empirical economic scrutiny is difficult. In Finland, statistical data on Finnish church membership is well available, but the main problems is its validity in proxying any religious statements. Finnish religious market is dominated by Evangelical-Lutheran Church of Finland, with 85% of population as its members. Belonging to that state church is not any statement on individuals religious desires or views, but rather a habit and custom which is not usually given any thought.

The largest alternative registered Christian church in Finland, which is not supported by state, is Finnish Free Church. It has about 15,000 members, but its influence in Finnish religious environment is much wider. Its growth would pretty much reflect the increase in religious activity and beliefs in Finland. While it is theologically close to Evangelical-Lutheran church, its membership and support is completely voluntary and it gets no financial state support. Free Church represents evangelical (maybe more reformist than Lutheran) type of protestant Christianity. As it is registered (unlike the Pentecostal movement in Finland, which is larger), it has wide statistical data archives covering over 100 years. That valuable data has not been applied before.

Using Finnish Free Church data, table 7 gives the estimation results from regressing per capita real income growth against Free Church membership growth. Balanced panel consists 61 municipalities in Finland from time period 1977-2002. This way the number of observations is pretty high ($n=1525$). Church membership growth is found to being positive (0.014) and statistically significant (in 5% significance level) in model 1 column. The results are not altered if town population growth is added as explanatory variable (model 2). Panel is estimated by applying random effects GLS modeling. Random effects model is chosen rather than fixed effects model due to usual Hausman test. All variables in regional estimations are in form of logarithmic differences with no unit-root properties.

Simple OLS real per capita income growth regressions were run for each municipal separately, using only church membership growth as explanatory variable. Time period is again 1977-2002. Results are presented in table 8. Most t-values for church growth variable are very small, but three towns gain at the same time a positive and significant coefficient. The result is interesting, as these three cities (Huittinen, Nokia, Kurikka) have some similarities in respect to religious properties. They all are pretty small cities, all

situated in south-western part of Finland. All these cities are known of their strong religious history and revival background. Kurikka is a stronghold of Finland's old revival Christian movement ("Körtti"-movement or "herännäisyys"), while Huittinen is in a centre of Evangelical-revival movement ("evangelisuus"). They both are small agrarian towns. In neither towns, Free Church is not the most important congregation, but its membership growth well represents the overall religious activity in these towns, having a much deeper influence in the nearby society, than in larger cities. While Nokia has the pretty same population size, it is not agrarian but old proletarian town. In religious sense, Nokia is well known of its contemporary flourishing religious movement, "Nokia revival" which has gained thousands of supporters during the last 15 years, not just in Nokia, but all over the country. Therefore, it is not a big surprise that especially these three towns are seen different in the data. They all represent areas of Finnish "Bible Belt."

5. Conclusion

Religious beliefs and activity give information on the properties of society's cultural and ethical base, and therefore they have some relevance when long term economic growth is considered. Moral institutions and ethics affect the economic development, as for example, trust and honesty are essential requirements for emerging economic activity. Empirical evidence seems to suggest that religious beliefs attain more relevance than religious attendance. Religious production efficiency, containing both belief and activity aspects, was not found statistically significant in 8 major OECD countries growth model, except for Finland. Significant coefficient for Finland can be explained by referring to Finland's unique religious market properties, as the level of religious beliefs have historically been unusually high, and continue to be, in Finland. This is especially true in three towns (Huittinen, Nokia, Kurikka) in Finland, which belong to the Finland's "Bible Belt" area, all parts of Christian revival movements. On the other hand, attendance in religious activities has followed the typical Northern-European decreasing trend and levels.

Nevertheless, defectiveness of theoretical background for analyzing the relationship between economic and religious phenomenon is apparent. More exact understanding on the links between these concepts are essentially needed to better model the economic consequences of cultural, religious and moral variables. We do not have any clear evidence

on whether the relation between economy and religions is one- or two-directional, neither on how this link operates.

Secondly, more accurate and longer time series data should be gathered to better estimate the long-term growth paths. In this paper, little more than 30 year annual data is used, which probably tells more on short-term business cycle behavior than underlying long-term economic growth. Third failure is to find appropriate econometric method for this estimation. Cross-country analyses are unable to present valid and well-specified estimators as the parameters most probably are heterogeneous, of which proofs were found also in this paper. The cross-country growth model parameters are not constant across units, but the countries have all different model relating growth to its determinants. Panel data methods offer a good alternative, but problems with statistical inference remain and the interpretation of estimators may be difficult. Additionally, more degrees of freedom would be required. Analysis of interdependence between economic and religious variables is just in its early stages and offers interesting research agenda for future economic scrutiny. Increased understanding on that link has the potential to give economic growth theory and empirical analysis a major boost forward.

References

- Abbotts, J.E., Williams, R.G.A., Sweeting, H.N. and West, P.B. (2004). "Is going to church good or bad for you? Denomination, attendance and mental health of children in West Scotland." *Social Science & Medicine*, 58, 3, Feb, 645-656.
- Agarwala, R. (1983). "Price Distortions and Growth in Developing Countries." World Bank staff working papers, no. 575, July.
- Anderson, G. (1988). "Mr. Smith and the Preachers: The Economics of Religion in the Wealth of Nations." *Journal of Political Economy*. 96, 5, 1066-1072.
- Anderson, and Tollison, R., (1992). "Morality and Monopoly. The Constitutional Political Economy of Religious Rulers". *Cato Journal*. 12:2.
- Akerlof, G., Kranton, R. (2000). "Economics and Identity." *The Quarterly Journal of Economics*. 115, 3, August, 715-753.
- Balassa, B. (1964). "The Purchasing Power Parity Doctrine: A Reappraisal." *Journal of Political Economy*. 72, 584-596.
- Barro, R.J. (1989). "A Cross-Country Study of Growth, Saving, and Government." NBER Working Paper no. 2855.
- Barro, R.J. (1990). "Government Spending in a simple model of Endogenous Growth." *Journal of Political Economy*. 48, 103-125.
- Barro, R.J. (1991). "Economic Growth in a Cross Section of Countries," *The Quarterly Journal of Economics*, Vol. 106, No. 2, May, 407-443.
- Barro, R.J. (2000). "Inequality and Growth in a Panel of Countries." *Journal of Economic Growth*, March, 5-32.
- Barro, R.J. and McCleary, R.M. (2002). "Religion and Political Economy in an International Panel." NBER Working Paper no. 8931.
- Barro, R.J. and McCleary, R.M. (2003a). "Religion and Economic Growth." NBER Working Paper no. 9682.
- Barro, R.J. and McCleary, R.M. (2003b). "International Determinants of Religiosity." NBER Working Paper no. 10147.
- Baumol, W. (1986). "Productivity Growth, Convergence, and Welfare." *American Economic Review* 76 (December). 1072-1085.
- Becker, G. (1988). "Family Economics and Macro Behavior." *The American Economic Review*. 78, 1, 1-13.

- Becker, G., Barro, R. (1988). "A Reformulation of the Economic Theory of Fertility." *The Quarterly Journal of Economics*. 103, 1, 1-25.
- Becker, G., Glaeser, E., Murphy, K. (1999). "Population and Economic Growth." *The American Economic Review*. 89, 2, 145-149.
- Becker G., Murphy, K., Tamura, R. (1990). "Human Capital, Fertility, and Economic Growth." *Journal of Political Economy*. 48, 12-37.
- Beed, C. and Beed, C. (1996). "A Christian perspective on economics." *Journal of Economic Methodology*, 3:1, 91-112.
- Berger, P. (1997). "Epistemological Modesty: An Interview with Peter Berger." *The Christian Century*. 114, 30, 972-978.
- Bleaney, M. and Nishiyama, A. (2002). "Explaining Growth: A Contest between Models." *Journal of Economic Growth*, 7, 43-56.
- Brenner, R. and Kiefer, N.M. (1981). "The Economics of the Diaspora. Discrimination and Occupational Structure". *Economic Development and Cultural Change*. 29:3. 517-534.
- Cameron, S. (1999). "Faith, frequency, and the allocation of time: a micro level study of religious capital and participation." *The Journal of Socio-Economics*. 28, 439-456.
- Chiswick, B. (1985). "The Labor Market Status of American Jews. Patterns and Determinants." *American Jewish Yearbook*, 85. 131-153.
- Chiswick, B. (1983). "The Earnings and Human Capital of American Jews". *Journal of Human Research*. 18:3, 313-336.
- Cosgel, M.M., Minkler, L. (2004). "Rationality, integrity, and religious behavior." *The Journal of Socio-Economics*. Article in press.
- Delacroix, (1992). "A Critical Empirical Test of the Common Interpretation of the Protestant Ethic and the Spirit of Capitalism". *Int. Assoc. Business & Society*, Belgium.
- De Long, J.B. (1988). "Productivity Growth, Convergence, and Welfare: Comment." *American Economic Review* 78 (December). 1138-1154.
- Edwards, S. (1993). "Openness, Trade Liberalization, and Growth in Developing Countries." *Journal of Economic Literature*. 31, 3, pp. 1358-1393.
- Engels, F. (1844). "Outlines of a Critique of Political Economy", in Marx, K. "Economic and Philosophical Manuscripts of 1844", London, Lawrence & Wishart.

- Frank, R. H. (1987). "If Homo Economicus could choose his own utility function, would he want one with a conscience?" *The American Economic Review*. 77, 4, September, 593-604.
- Freeman, R.B. (1986). "Who Escapes? The Relation of Churchgoing and Other Background Factors to the Socioeconomic Performance of Black Male Youths from Inner-city Tracts. In "The Black Youth employment Crisis" by Richard B. Freeman and Harry J. Holzer, (eds.) Chicago and London. University of Chicago Press, pp.353-376.
- Greif, A. (1994). "Cultural Beliefs and the Organization of Society". *Journal of Political Economy*, 102:5.
- Grier, R.M. (1997). "The Effect of Religion on Economic Development: A cross-national study of 63 former colonies." *Kyklos*. 50, 1, 47-62.
- Guiso, L., Sapienza, P. and Zingales, L. (2003). "People's opium ? Religion and Economic attitudes." *Journal of Monetary Economics*. 50, 225-282.
- Hanssmann, F. (2000). "Christian perspectives in Economics." *Professorenforum-Journal*. 1, 2, 19-24.
- Heath, W.C., Waters, M. S. and Watson, J. K. (1995). "Religion and economic welfare: An empirical analysis of state per capita income." *Journal of Economic Behavior and Organization*. 27, 1, June, 129-142.
- Hull, B.B. and Bold, F. (1995). "Preaching Matters - Replication and Extension." *Journal of Economic Behavior and Organization*. 27:1.
- Hume, D. (1757). "The Natural History of Religion." Ed. Gaskin, J.C.A. Oxford University Press.
- Iannaccone, L.R. (1998). "Introduction to the Economics of Religion." *Journal of Economic Literature*. 36, Sep, 1465-1496.
- Iannaccone, L.R., Olson, D., Stark, R. (1995). "Religious resources and Church growth." *Social Forces*. Dec, 74, 2, 705-731.
- Jones, C.I. (1995a). "R&D-Based Models of Economic Growth." *Journal of political Economy*, 103, August, 759-784.
- Jones, C.I. (1995b). "Time Series tests of Endogenous Growth Models." *The Quarterly Journal of Economics*, May, Vol. 110, 495-525.
- Keely, L.(2003). "Comment on: People's opium ? Religion and economic attitudes." *Journal of Monetary Economics*. 50, 283-287.

- Klenow, P.J. and Rodríguez-Clare, A. (1997). "Economic growth: A review essay." *Journal of Monetary Economics*, 40, 597-617.
- Kuran, T. (1997). "Islam and Underdevelopment." *Journal of Instit.&Theor.Econ.* 153:1.
- Kuran, T. (1995). "Private Truths, Public Lies." Harvard University Press.
- Levin, J.S. (1994). "Religion and Health. Is there an Association, is it valid and is it causal?" *Soc.Sci.Med.* 38.11.1475-1482.
- Lipford, J.W., McCormick, R. and Tollison, R.D. (2003). "Religious participation and income." *Journal of Economic Behavior and Organization.* 51, 2, June, 249-260.
- Lipford, J.W., McCormick, R. and Tollison, R.D. (1993). "Preaching Matters." *Journal of Economic Behavior and Organization.* 21:3.
- Mankiw, N.G., Romer, D. and Weil, D.N. (1992). "A Contribution to the Empirics of Economic Growth". *The Quarterly Journal of Economics*, 107, 2, 407-437.
- Millendorfer, J. (1984). "Hemmfaktoren einer gerechten industriellen Entwicklung. In: Vereinigung der Politologen an der Hochschule für Politik München. Energie und Gerechtigkeit. Inderdisz.Reihe no 6, Minerva Publikation München.
- Minkler, L., Cosgel, M. (2004). "Religious Identity and Consumption." Department of Economics Working Paper Series, February 2004-03, University of Connecticut.
- Pritchett, L. (1996). "Population, Factor Accumulation, and Productivity." World Bank working paper no. 1567.
- Rebelo, S. (1990). "Long Run Policy Analysis and Long Run Growth." NBER working paper, no.3325, April.
- Romer, P. (1990). "Endogenous Technological Change." *Journal of Political Economy*, vol. 98, 5, 71-102
- Samuelsson, K. (1993). "Religion and Economic Action. The Protestant Ethic, the Rise of Capitalism, and the Abuses of Scholarship". University of Toronto Press.
- Smith A. (1790). "The Theory of Moral Sentiments." Edited by Macfie, A., Raphael, D. Indianapolis. Liberty, 1982.
- Solow, R.M. (1956). "A Contribution to the Theory of Economic Growth." *Quarterly Journal of Economics.* 70, 65-94.
- Stark, R. (2004). "An Economics of Religion." In: *The Blackwell Companion to the Study of Religion.* Edited by Segal, R., Oxford, Blackwell.

- Tawney, R.H. (1926). "Religion and the Rise of Capitalism." New York.
- Temple, J. (2000). "Growth Regressions and what the Textbooks Don't Tell You." *Bulletin of Economic Research*, 52, 3, 181-205.
- Temple, J. (1999). "The New Growth Evidence." *Journal of Economic Literature*. 37, March, 112-156.
- Weber, M. (1904). "Die Protestantische Ethik und der Geist des Kapitalismus." London, Allen and Unwin, engl. 1930, "The Protestant Ethic and the Spirit of Capitalism". Translated by Talcott Parsons.

APPENDIX.

Tables, notes and abbreviations.

Table 1. Variables for (per capita) economic growth estimation. Assumed signs.

Explaining variable	Representative research	Assumed sign
Investment rate , I/GDP	Solow (1956) ; Rebelo (1990)	+
Population growth	Pritchett (1996) ; Romer (1990)	- / +
Population	Kremer (1993)	- / +
Fertility rate	Becker, Glaeser, Murphy (1999) ; Becker, Murphy, Tamura (1990) ; Becker (1988), Barro (1989)	-
Schooling	Romer (1990) ; Barro (1991)	+
Government expenditure, G/GDP	Barro (1990)	-
Inflation	Balassa (1964) ; Agarwala (1983)	-
Ratio of public to total investment	Barro (1991)	+
International openness, (X+M)/GDP	Edwards (1993)	+

Table 2. Descriptive statistics of religious beliefs ω (belief in Hell)

	Finland	Sweden	Norway	Denmark	USA	Germany	Spain	Japan
Mean	0.340	0.116	0,219	0,096	0,733	0,195	0,378	0,304
σ	0,099	0,021	0,028	0,045	0,015	0,104	0,051	0,054
Skewness	-0,658	-0,130	0,556	2,373	-0,366	2,170	0,390	2,084
Ex.kurt.	0,350	-1,184	-1,115	4,510	-1,027	3,405	-0,605	3,904
Normality	2,788	2,901	10,426	83,982	3,940	78,874	1,558	40,458
$\chi^2(2)$	0,248	0,234	0,005 **	0,000 **	0,140	0,000 **	0,459	0,000 **

Table 3. Descriptive statistics of religious activity τ (church attendance at least once a month).

	Finland	Sweden	Norway	Denmark	USA	Germany	Spain	Japan
Mean	0.124	0.127	0,129	0,094	0,530	0,296	0,410	0,104
σ	0,015	0,036	0,0214	0,019	0,160	0,085	0,219	0,044
Skewness	0,587	0,024	-1,280	-0,905	-2,169	-1,475	-1,383	-1,894
Ex.kurt.	-1,123	-0,877	1,077	-1,040	3,445	0,916	1,313	2,689
Normality	11,981	0,509	13,552	43,646	76,037	34,049	16,660	42,823
$\chi^2(2)$	0,003 **	0,738	0,001 **	0,000 **	0,000 **	0,000 **	0,00**	0,000 **

Table 4. Descriptive statistics of religious production efficiency variable R

	Finland	Sweden	Norway	Denmark	USA	Germany	Spain	Japan
Mean	2.695	0.989	1,704	1,155	1,529	0,863	1,691	3,925
σ	0,595	0,411	0,203	0,857	0,711	0,921	2,134	3,804
Skewness	-1,876	1,768	1,828	2,152	2,220	2,146	2,232	2,290
Ex.kurt.	3,251	1,824	2,796	3,326	3,620	0,302	3,673	3,951
Normality	28,102	51,052	31,055	77,416	83,015	76,773	83,916	87,644
$\chi^2(2)$	0,000 **	0,000 **	0,000 **	0,000 **	0,000 **	0,000 **	0,00**	0,000 **

Table 5. Panel estimation results for economic growth. Fixed effects (within) models.

Explanatory variables	Model 1	Model 2
Constant	0.921 (0.180) 5.12 **	0.932 (0.191) 4.88 **
Lagged growth	0.260 (0.060) 4.35 **	0.275 (0.061) 4.49 **
Population growth	0.146 (0.016) 9.26 **	0.152 (0.017) 9.12 **
Population level	-0.097 (0.018) -5.37 **	-0.099 (0.019) -5.09 **
Fertility rate	-0.031 (0.011) -2.86 **	-0.031 (0.011) -2.83 **
Inflation	-0.096 (0.029) -3.35 **	-0.100 (0.024) -4.24 **
Secondary schooling	-0.000 (0.000) -2.41 *	-0.000 (0.000) -2.53 *
Inflation	-0.096 (0.029) -3.35 **	-0.100 (0.024) -4.24 **
Investment rate	0.139 (0.075) 1.85	0.133 (0.083) 1.61
Public investment rate	0.054 (0.010) 5.16 **	0.054 (0.009) 5.87 **
Government expenditure	-0.729 (0.143) -5.11 **	-0.726 (0.119) -6.11 **
International trade openness	0.030 (0.015) 1.97	0.030 (0.016) 1.85
Religious efficiency	-0.000 (0.000) -1.19	
Religious belief		0.018 (0.009) 1.98 *
Religious activity		0.008 (0.011) 0.71
R ²	0.330	0.332
F(7,228)	3.21 [0.003] **	2.57 [0.014] *
AR(1) test N(0,1)	1.656 [0.098]	1.583 [0.113]
AR(2) test N(0,1)	-1.698 [0.090]	-1.590 [0.112]

Note: Hausman test suggested for using fixed-effects vs. random-effects model, $\chi^2(11)=22.30$ [0.0222] *

Table 6. Estimation results for economic growth with appended religious variables.

	Finland	Sweden	Norway	Denmark	USA	Germany	Spain	Japan
Relig.	0,045	-0,056	-0,055	-0,028	0,011	-0,004	0,013	-0,002
Effic.	(0,018)	(0,039)	(0,043)	(0,021)	(0,023)	(0,009)	(0,009)	(0,002)
	2,44 *	-1,46	-1,28	-1,34	0,49	-0,40	1,43	-1,14
ω	0,338	-1,699	0,493	-0,402	0,235	0,225	1,086	0,207
	(0,141)	(0,678)	(0,818)	(0,372)	(0,277)	(0,144)	(0,502)	(0,127)
	2,41 *	-2,51 *	0,60	-1,08	0,85	1,56	2,16 *	1,63
τ	-6,714	-0,484	1,024	0,063	-0,095	0,845	-0,308	0,549
	(1,764)	(0,783)	(0,692)	(1,220)	(0,121)	(0,405)	(0,134)	(0,215)
	-3,81 **	0,62	1,48	0,05	-0,79	2,09	-2,30 *	2,56 *
R^2	0,648	0,458	0,531	0,356	0,661	0,670	0,647	0,668
F(10,20)	(3,689)**	(1,691)	(2,269)	(1,102)	(3,896)**	(4,056)**	(3,668)**	(4,029)**
DW	2,02	2,08	2,04	2,80	2,12	2,36	2,47	2,43
R^2	0,771	0,555	0,569	0,357	0,672	0,731	0,709	0,737
F(11,19)	(5,802)**	(2,157)	(2,284)	(0,959)	(3,533)**	(4,694)**	(4,202)**	(4,846)**
DW	2,49	2,03	2,09	2,75	2,14	2,40	2,82	2,65

Notes: Std.errors in parenthesis, below parenthesis are the t-values. * denotes statistical significance in 5% and ** in 1% level.

Table 7. Panel estimation results for Finland. Dependent variable per capita taxable real incomes. Time period 1977-2002. Coefficients, standard deviations and t-values for the estimated parameters.

	Model 1	Model 2
Constant	0.282 (0.001)	0.282 (0.001)
	33.05 **	33.14 **
Church membership growth	0.014 (0.007)	0.015 (0.007)
	2.05 *	2.29 *
Population growth	-	-0.228 (0.097)
		-2.34 *
R ²	0.070	0.175
N	1525	1525
Groups	61	61
Wald P ² (1,2)	4.22	9.71

Notes. Random effects model (vs. fixed effects alternative) estimation chosen due to Hausman test results. P²(1)= 2.30 [0.1290]

Table 8. Estimation results for Finland's growth and regional religious properties.

Municipality	Constant	Church growth	t-value (Church growth)	R ²	DW
Alajärvi	0,037 (0,007)	0,002 (0,048)	0,048	0,000	1,51
Forssa	0,028 (0,007)	-0,042 (0,031)	-1,38	0,076	0,91
Haapavesi	0,034 (0,008)	-0,005 (0,055)	-0,097	0,000	1,58
Hanko	0,029 (0,005)	-0,074 (0,037)	-2,02	0,151	1,25
Heinola	0,029 (0,006)	-0,051 (0,045)	-1,13	0,052	1,04
Helsinki	0,022 (0,007)	0,114 (0,147)	0,776	0,025	1,00
Huittinen	0,030 (0,008)	0,092 (0,040)	2,30 *	0,186	2,09
Hyrnsalmi	0,030 (0,008)	0,019 (0,033)	0,581	0,014	1,63
Hyvinkää	0,026 (0,006)	-0,002 (0,043)	-0,043	0,000	0,91
Hämeenlinna	0,018 (0,007)	0,139 (0,125)	1,12	0,051	1,08
Ikaalinen	0,027 (0,007)	0,092 (0,046)	2,00	0,148	1,74
Iломantsi	0,033 (0,007)	0,030 (0,067)	0,446	0,010	1,68
Joensuu	0,021 (0,006)	0,032 (0,068)	0,466	0,009	1,20
Jyväskylä	0,020 (0,007)	0,064 (0,146)	0,441	0,008	0,99
Jämsänkoski	0,029 (0,006)	-0,032 (0,042)	-0,772	0,025	1,62
Järvenpää	0,029 (0,008)	0,018 (0,060)	-0,311	0,004	0,77
Kajaani	0,026 (0,005)	0,010 (0,019)	0,498	0,011	1,19
Kangasniemi	0,036 (0,009)	-0,050 (0,069)	-0,722	0,022	1,34
Kankaanpää	0,029 (0,006)	0,013 (0,062)	0,203	0,002	1,03
Kauhava	0,031 (0,007)	0,055 (0,107)	0,512	0,011	1,36
Keuruu	0,029 (0,006)	0,000 (0,080)	0,006	0,000	1,47
Kihniö	0,037 (0,008)	0,082 (0,059)	1,40	0,078	1,59
Kitee	0,035 (0,007)	-0,011 (0,060)	-0,187	0,002	1,37
Konnevesi	0,037 (0,008)	0,012 (0,049)	0,239	0,002	1,25
Kotka	0,026 (0,005)	0,038 (0,113)	0,337	0,005	0,91
Kouvola	0,022	-0,054	-0,368	0,006	0,90

	(0,006)	(0,148)			
Kuopio	0,020	0,192	2,00	0,148	0,942
	(0,006)	(0,096)			
Kurikka	0,026	0,219	3,42 **	0,337	1,57
	(0,006)	(0,064)			
Kyyjärvi	0,043	0,058	0,594	0,015	1,37
	(0,009)	(0,098)			
Lahti	0,024	-0,046	-0,224	0,002	1,11
	(0,007)	(0,203)			
Lammi	0,030	0,014	0,174	0,001	1,24
	(0,007)	(0,079)			
Lappeenranta	0,024	0,022	0,902	0,034	1,12
	(0,006)	(0,024)			
Lapua	0,032	0,108	0,720	0,022	1,88
	(0,007)	(0,150)			
Lohja	0,027	0,050	0,847	0,030	0,86
	(0,006)	(0,059)			
Mikkeli	0,042	-0,121	-0,795	0,027	1,79
	(0,015)	(0,152)			
Nokia	0,026	0,190	2,74 *	0,245	1,7
	(0,005)	(0,070)			
Oulu	0,025	-0,012	-0,191	0,002	1,33
	(0,006)	(0,063)			
Parkano	0,030	0,089	1,28	0,067	1,32
	(0,006)	(0,069)			
Pieksämäki	0,022	0,012	0,353	0,001	0,928
	(0,005)	(0,035)			
Pori	0,023	0,013	0,178	0,001	1,15
	(0,005)	(0,073)			
Porvoo	0,029	0,027	0,708	0,021	0,903
	(0,006)	(0,038)			
Raahe	0,023	-0,028	-0,530	0,012	1,26
	(0,005)	(0,053)			
Rauma	0,028	-0,022	-0,462	0,009	0,929
	(0,006)	(0,047)			
Riihimäki	0,025	0,019	0,402	0,007	0,909
	(0,006)	(0,047)			
Rovaniemi	0,019	0,026	0,799	0,270	1,36
	(0,006)	(0,033)			
Saarijärvi	0,031	0,084	0,937	0,037	1,25
	(0,007)	(0,090)			
Savonlinna	0,025	0,024	0,420	0,008	0,91
	(0,006)	(0,056)			
Seinäjoki	0,022	0,015	0,198	0,002	1,12
	(0,006)	(0,075)			
Sumiainen	0,041	0,038	0,544	0,013	1,91
	(0,011)	(0,070)			
Suolahti	0,026	0,113	1,56	0,095	1,41
	(0,006)	(0,073)			
Suonenjoki	0,031	0,015	0,281	0,003	1,43
	(0,007)	(0,052)			
Tampere	0,021	0,148	1,12	0,052	1,06
	(0,006)	(0,132)			
Tornio	0,031	-0,006	-0,265	0,003	1,69
	(0,006)	(0,021)			

Turku	0,019 (0,006)	0,099 (0,065)	1,53	0,092	0,989
Uusikaupunki	0,028 (0,007)	-0,009 (0,051)	-0,172	0,001	1,32
Vaasa	0,024 (0,005)	-0,015 (0,029)	-0,509	0,011	1,08
Vammala	0,028 (0,006)	-0,010 (0,050)	-0,191	0,002	1,29
Varkaus	0,024 (0,006)	0,044 (0,055)	0,795	0,027	1,48
Viitasaari	0,033 (0,007)	0,082 (0,102)	0,805	0,027	1,28
Virrat	0,030 (0,008)	0,083 (0,074)	1,12	0,052	1,64
Äänekoski	0,031 (0,006)	-0,031 (0,076)	-0,411	0,007	1,2

Notes: Annual time series data from period 1977-2002. Number of observations in each OLS regression is 25. Variables are in log-differences, with no unit-root properties.

Additional information on the model variables:

Annual time series data is from the period 1971-2001. (Some variables include interpolating technique for controlling some missing values). Country specific data includes 8 OECD countries: Finland, Sweden, Norway, Denmark, USA, Germany, Spain, Japan).

- Per capita real GDP growth, common PPP, differential natural log
- Belief in Hell, yes answer, % of population
- Church attendance, at least monthly, % of population
- Population (in millions), natural log
- Growth rate of population
- Inflation rate, %, consumer price
- Fertility rate, total
- Government final consumption expenditure, common (1995) prices
- Gross fixed capital formation, total, common (1995) prices
- Exports of goods and services, common (1995) prices
- Imports of goods and services, common (1995) prices
- Gross domestic product (expenditure approach, common (1995) prices.
- Ratio of real domestic investment (private plus public) to real GDP
- Ratio of real government consumption to real GDP
- Ratio of real government consumption to total domestic investments
- Ratio of export plus import to real GDP
- Second level schooling completed of the total population aged 15 and over, %.

Data from World Values Surveys, in the courtesy of Finnish Social Science Data Archive, FSD, Tampere, Finland: The data uses the following material: World values surveys and European values surveys, 1981-1984, 1990-1993 and 1995-1997 [Elektroninen aineisto]. By Ronald Inglehart [et al.]. ICPSR version. Ann Arbor, MI : Institute for Social Research, 2000. Ann Arbor, MI : Inter-university Consortium for Political and Social Research ; Tampere : Yhteiskuntatieteellinen tietoaarkisto, 2000. World Values Survey 2000: Suomen aineisto. Versio 4. Suomen Gallup & Kirkon tutkimuskeskus. Tampere : Yhteiskuntatieteellinen tietoaarkisto, 2003.

Variables for regional estimations include membership data from Finnish Evangelical Free Church, including time period 1977-2002 and 61 municipalities. Membership data includes also children. Finnish Free Church data is by the courtesy of Finnish Free Church.