



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Culture, religion and productivity: Evidence from European regions

Anneli Kaasa

School of Economics and Business Administration, University of Tartu

corresponding e-mail: anneli.kaasa@ut.ee

address: Narva Road 4-A210, 51009 Tartu, Estonia

This study investigates how a region's labour productivity could be influenced by cultural dimensions and religion - factors that have not received much attention in the previous literature. As another novelty, regional-level data (78 regions of 22 European countries) were analysed. Correlation and regression analysis was performed. The results showed individualism to be positively and masculinity and power distance to be negatively related to labour productivity. When cultural dimensions were included, both general religiosity and the achievement motivation indicator capturing the values of a strong work ethic turned out to be insignificant.

JEL Classifications: J24, O40, R11

Keywords: Productivity, culture, religion, Europe, regions

Citation: Kaasa A., 2016. "Culture, religion and productivity: Evidence from European regions", *Business and Economic Horizons*, Vol. 12(1), pp. 11-28, <http://dx.doi.org/10.15208/beh.2016.02>

Introduction

Productivity plays an important role for economic growth and the welfare of people. Hence, there is no doubt that the possible determinants of productivity deserve to be studied. When looking at the determinants of productivity at the aggregate (society) level, the research has mainly focussed on factors like human capital, R&D, innovations etc. that have been shown to be positively related to productivity and economic growth. However, it has been argued that these factors may not be sufficient for explaining differences in the levels of productivity in different countries (Sayes, 2011). Hence, the research has to go beyond these standard factors of productivity and explore other possible factors (Beugelsdijk and van Schaik, 2005). There is one important background-forming phenomenon that has not received much attention in the literature, but is worthwhile to investigate as possibly affecting productivity. This phenomenon comprises people's values, beliefs, attitudes, behaviour, etc., often also referred to as culture. In addition, religion is something that often guides people's choices and behaviour. As productivity can be expected to be related to the everyday performance of the workforce, cultural and religion-related differences may prove quite useful in explaining differences in productivity levels between countries or regions.

Unfortunately, the research has paid little attention to culture and religion in the context of productivity and even in the broader context of economic development and growth (Barro and McCleary, 2003; Gorodnichenko and Roland, 2010). While the possible impact of culture and/or religion on productivity has been theoretically addressed more or less directly in many studies, only a few studies have examined these relationships empirically (Hall and Jones, 1999; Islam, 2008; Grafton et al., 2002; Gorodnichenko and Roland,

¹ This work was supported by the institutional research funding IUT 20-49 of the Estonian Ministry of Education and Research

2010). Furthermore, most of these studies have been limited to the ethnolinguistic and religious fractionalisation. However, there is much more than fractionalisation - fractionalisation does not say anything about culture itself. There are different concepts for describing and measuring culture available in the literature (for instance Hofstede, 1980; Schwartz, 1994; Inglehart and Baker, 2000; House et al., 2002). Also, there are many more aspects related to religion than fractionalisation, such as general religiosity, shares of different religious denominations, etc. In addition, it is reasonable to assume that there may also be some significant within-country differences related to culture and religion (see, for example, Kaasa et al., 2013; Kaasa et al., 2014) and hence, the impact on productivity may differ significantly too. However, most of the literature on productivity focusses on the country level analysis (Dettori et al., 2012; Artige and Nicolini, 2006) and there are no studies analysing the impact of culture or religion on productivity at the regional level. This article aims to address all these shortcomings in the existing research.

The aim of this study is to explore the possible impact of culture and religion on the productivity levels of European countries at the regional level. More specifically, labour productivity as the most widely used measure of productivity is employed as a dependent variable. Cultural dimensions based on Hofstede's (1980) concept, general religiosity, the share of hierarchical religion and an indicator reflecting the work ethic are included into the analysis in addition to the standard factors of productivity as control variables. The data for calculating labour productivity indicators as well as the data for the control variables came from Eurostat. The data for religion-related indicators came from the European Values Study (see EVS, 2010) and the European Social Survey (see ESS, 2008). Factor analysis is used for creating variables based on the initial indicators from these surveys. The data for describing cultural dimensions came from Kaasa et al. (2014), who also used the ESS and EVS as initial data sources. All these data sources enable to analyse European regions at the NUTS 1 level. 78 regions of 22 European countries are covered in this analysis. Correlation and regression analysis is used to examine the relationships between different factors and labour productivity.

This article is organised as follows. Section 2 presents the theoretical background and Section 3 introduces the data and operationalisation. Section 4 reports and Section 5 discusses the results. Section 6 draws conclusions.

Theoretical background

There are many different definitions of productivity (see, for example, Tangen, 2005). In the current article productivity is understood as efficiency in production: the relation of output to input which can be expressed as an output-input ratio (Syverson, 2011). For productivity defined in this way, the most widely used measure is labour productivity (Isaksson, 2007), although sometimes capital or materials productivity are also used (Syverson, 2011; OECD, 2001; Sharpe, 2004). Here, it has to be kept in mind that labour productivity as an output-input ratio does not reflect only the productivity of labour in terms of the capacities or efforts of the workers, but also, for instance, the availability and using intensity of other production factors or technical change (OECD, 2001; Sharpe, 2004). Hence, despite the name and the fact that labour is used as input when finding the output-input ratio, labour productivity actually reflects the impact of all factors that affect productivity (Sharpe, 2004). An alternative measure that is also often used, is multi factor productivity, also referred to as total factor productivity (TFP), which shows the change in output that is not explained by the change in the observable outputs like labour or capital (Syverson, 2011; OECD, 2001). Although the indicators of labour productivity and TFP may often show the same trends, their different nature has to be taken into account as a possible explanation for somewhat different empirical results. Productivity can be viewed at the firm level or at the aggregate or society (country, regional) level. In this article, the society level productivity is analysed.

Regarding possible factors influencing productivity, production factors can be used more effectively by applying new technologies. Indeed, innovation has been viewed as and confirmed to be crucial for productivity (Crespi and Zuñiga, 2010; Peters et al., 2003; Hall, 2011; Sayes, 2011; Isaksson, 2007; Sharpe, 2004). Most studies of the drivers of productivity have included innovation and new technology in one or another form. Another factor that is often involved is R&D. For creating and applying new technologies, R&D is very important, leading to new ideas and solutions as well as forming an absorptive capacity for using those new ideas and solutions. R&D has been confirmed to be positively related to productivity (Crespi and Zuñiga, 2010; Griffith et al., 2004; Syverson, 2011; Isaksson, 2007).

Next, human capital is also viewed as affecting productivity. Indicators of human capital have often been included into the analysis when studying determinants of productivity and a positive relationship with productivity has been shown (Gorodnichenko and Roland, 2010; Yamamura and Shin, 2012; Ghulam, 2012; Sharpe, 2004; Isaksson, 2007). The level of human capital determines the quality of the labour force. Well-educated workers are more likely to effectively use other production factors as well as develop and apply new ideas. Hence, education determines the economy's capacity to carry out technological innovations as well as the so called absorptive capacity: the ability to adopt technologies that have been created and are already used by others (Isaksson, 2007, Sharpe, 2004; Ghulam, 2012).

One phenomenon that should also be considered as possibly influencing productivity is culture. It is commonly accepted that culture plays an important role in many life domains. However, there is no consensus in defining culture and various definitions of culture are used in different research fields (see, for example, Chanchani and Theivanathampillai, 2002 or Hall, 1980 for an overview). Here, the notion of culture is based on the sociological approach. Based on the common elements of various definitions, culture can be defined as a set of shared values, beliefs and behaviours of a group of people, in this case of a country or region (Kaasa et al., 2014). One reason why culture has often been left aside in the research can lie in the complexity of this phenomenon and difficulties in measuring culture (Forson et al., 2013). One possible approach that is widely used is to choose a set of dimensions that describe different aspects of culture and to view every country or region as a point in a multidimensional model. Many different sets of dimensions are available to classify culture (for example Hofstede, 1980; Schwartz, 1994; Inglehart and Baker, 2000; House et al., 2002). An overview can be also found in Taras et al. (2009). However, no systematic analysis of the relationship between culture and productivity based on any concept of culture can be found in the literature so far.

In the current article, Hofstede's (1980) original approach capturing cultural differences with the help of four dimensions - power distance, uncertainty avoidance, individualism-collectivism, and masculinity-femininity - is used as a basis. Although often criticised (see Chiang, 2005; Oyserman et al., 2002; McSweeney, 2002; Gooderham and Nordhaug, 2001 for examples) it is one of the most widely used concepts of culture in many research fields. Its extensive use during the last decades in both theoretical and empirical literature allows to view it as a grounded approach for describing culture. From the aforementioned four dimensions, individualism has received most attention in the context of productivity and has been claimed to be the most important dimension in the economic context (Gorodnichenko and Roland, 2010; Gorodnichenko and Roland, 2011).

Individualism (as opposed to collectivism) (IND) reflects the extent to which people prefer to act as individuals rather than as members of groups. In individualistic cultures, autonomy, individual freedom, initiative and rights are valued and everybody's responsibility is to take care for him/herself, whereas in collectivist cultures, close social relations are important and individuals expect groups to look after them in exchange for loyalty (Papamarcos and Watson, 2006; Kaasa et al., 2014; Waarts and van Everdingen, 2005). It has been claimed that in more individualistic cultures people are more achievement-oriented (Papamarcos and Watson, 2006; Gorodnichenko and Roland, 2010)

and they have more motivation and reasons to expect compensation and recognition for inventive ideas which may increase productivity (Kaasa and Vadi, 2010; Shane, 1992; Herbig and Dunphy, 1998; Forson et al., 2013; van Hoorn, 2014). Also, less loyalty to organisations in more individualistic cultures may make the exchange and diffusion of information and knowledge easier (Kaasa and Vadi, 2010; Herbig and Dunphy, 1998), for example through professional networks and relationships with friends and acquaintances. By lowering the cost of information search and exchange as well as allowing to adopt new innovations earlier, this could promote the economy's absorptive capacity which is very important for productivity (Isaksson, 2007).

Next, uncertainty avoidance (UAI) shows the degree to which people feel threatened by uncertainty and ambiguity. In the case of high uncertainty avoidance, there is a strong need for order, rules play an important role and are carefully followed, while in the case of low uncertainty avoidance, ambiguous and different situations are regarded as natural (Papamarcos and Watson, 2006; Kaasa et al., 2014). In societies with higher uncertainty avoidance there may be more resistance to new technologies (Shane, 1993; Waarts and van Everdingen, 2005). This resistance, in turn, may hold people back from coming out with new ideas and furthermore, the reliance on rules may constrain the possibilities for creating new solutions (Kaasa and Vadi, 2010). At the same time, it can be supposed that in societies with higher uncertainty avoidance and more regulations, there is also a stronger tendency to protect intellectual property with patenting and that may encourage creativity and finding more productive solutions (Kaasa and Vadi, 2010). Also, when fewer resources have to be used for securing individuals and firms from the theft of technologies, but also from other dishonest practices, more resources can be devoted to production and improving technology.

Power distance (PDI) describes the extent to which the unequal distribution of power in organisations and institutions and hierarchical relations are accepted in a culture (Papamarcos and Watson, 2006; Kaasa et al., 2014). A large power distance can be characterised by centralised decision structures and the extensive use of formal rules. In cultures with high power distance, diffusion of information may be constrained by the hierarchy (van Everdingen and Waarts, 2003). Also, in societies with high power distance, people tend to wait for action by the authorities rather than actively engage (Kaasa, 2015) and the powerful can be expected to be less willing to appreciate the initiatives of the powerless (Papamarcos and Watson, 2006). All this could hinder activities that could improve productivity.

Last, masculinity (as opposed to femininity) (MAS) reveals the degree to which masculine values, such as orientation towards achievement and success, assertiveness and competitiveness, prevail over values like modesty and good relationships, caring, solidarity or tolerance (Kaasa et al., 2014; Kaasa and Vadi, 2010). On the one hand, emphasising achievement and competition can be assumed to motivate people to work harder and also to find new and useful solutions, both improving productivity. On the other hand, it can be argued that the supportive climate offered by a more feminine culture makes workers feel more relaxed and thus more motivated to do their best. A more relaxed environment may help to cope with the uncertainty related to new solutions as well (Kaasa and Vadi, 2010). This also means that investment decisions can be made using a longer time horizon and it is possible to invest into riskier but eventually more productive projects (Bjørnskov and Méon, 2010).

Regarding empirical evidence, only one study can be found analysing the impact of individualism on productivity. Gorodnichenko and Roland (2010) found in their country-level analysis that both labour productivity and the TFP are positively and significantly influenced by individualism. Unfortunately, no other studies empirically testing the relationships between the described cultural dimensions and productivity could be found.

The culture of a country or a region is undoubtedly influenced by the ethnic background of the population. Some authors have included ethnolinguistic fractionalisation (see, for instance, Alesina et al., 2003) into the analysis of productivity determinants. The main

claim here is that fractionalisation may create barriers to communication and this can inhibit the diffusion of information and knowledge as well as the exchange of ideas (Grafton et al., 2002; Isaksson, 2007). However, the fractionalisation indices do not measure the quality of the communication or the size of the barriers (Grafton et al., 2004); instead, they only enable to estimate the probability of barriers existing. Furthermore, it is also possible that people with different backgrounds contribute different ideas that may lead to radical breakthroughs remarkably improving productivity (Sharpe, 2004; Grafton et al., 2004; Isaksson, 2007). In addition, the indicator of ethnolinguistic fractionalisation does not take into account how similar or different the ethnic groups in a country or region are. Differently from the cultural dimensions introduced before, the fractionalisation index does not provide any information about the culture itself. This may explain the fact that although ethnolinguistic fractionalisation has been found to be negatively related with productivity (Islam, 2008; Grafton et al., 2002), when individualism was also included into the analysis, ethnolinguistic fractionalisation turned out to be insignificant for productivity (Gorodnichenko and Roland, 2010).

Besides culture, religion and religiosity can be assumed to have an important effect on productivity. Here it should be mentioned that often religion has been viewed as a part of culture and there is also discussion about the relationship between culture and religion, some authors arguing culture to be preceding religion (see, e.g. Reimer, 1995; Hofstede, 1997) and others viewing religion as a source of culture (see, e.g. Schwartz, 2009; Aldashev and Platteau, 2014). In this paper, religion is viewed separately from culture. This approach is chosen because although it has been argued that religion has had an important role in forming today's cultural patterns (Halman and Luijkx, 2006), there are many other determinants of culture, such as historical, geographical or environmental factors (Foley and Mirazón Lahr, 2011; Michalopoulos, 2012).

The main argumentation behind the impact of religion on productivity is based on the concept of the Protestant work ethic introduced by Max Weber, claiming that the spread of values such as hard work, honesty, responsibility, strive for professional development, achievement, thrift, discipline etc. promoted by the Protestant religion led to the development of capitalism in the Protestant Europe (Altynbekov et al., 2013; Linz and Chu, 2013; Barro and McCleary, 2003; Forson et al., 2013). A strong work ethic has been argued to be closely related both to individual and firm performance (Linz and Chu, 2013). The workers' values determine their motivation and interest in their duties and thus the work effort, including both the quality and quantity of the time expended on the job (Linz and Chu, 2013; Altynbekov et al., 2013). However, there is mixed empirical evidence about this logic (Mangeloja, 2008). Concerning productivity determinants, Islam (2008), in his cross-country analysis, found that Protestantism as a dominant religion was negatively and the Muslim religion positively, although not significantly, related to the TFP. Recently, evidence has indicated that a strong work ethic is not unique to Protestantism, but is related rather to general religiosity (see Linz and Chu, 2013 for an overview).

Hence, general religiosity could be one possible determinant of productivity worth investigating. Unfortunately, again no other studies empirically testing the relationships between different religious denominations or general religiosity and productivity could be found. Religious fractionalisation has been analysed as a possible determinant of productivity (Grafton et al., 2002; Islam, 2008; Grafton et al., 2002) often showing a negative relationship with productivity. However, the problems with this indicator are the same as those related to the ethnolinguistic fractionalisation: it does not take into account how similar or different the religious denominations in a country or region are, and also it

can only estimate the probability of problems, such as communication barriers or political instability (Isaksson, 2007), caused by the fractionalisation, but not the actual situation.

Data and operationalisation

This study analyses the data of 78 regions on the NUTS 1 level of 22 European countries. The NUTS - Nomenclature of Territorial Units for Statistics - is a widely used hierarchical classification of regions within countries established by Eurostat (see European Commission. Eurostat, 2012). This classification subdivides each country (NUTS 0 level) into one or more NUTS 1 regions, each of which, in turn, can be subdivided into one or more NUTS 2 regions and so on. At the NUTS 1 and NUTS 2 levels, countries are divided into regions based on administrative divisions as well as the lower and upper limits for the population size for each level. The NUTS 1 level was chosen in order to capture possible regional differences; data at the NUTS 2 level were not available for most of indicators used here.

For measuring the aggregate level productivity of a particular region, in this article labour productivity was chosen as the most widely used measure of productivity. Regarding the output indicator of labour productivity (as an output-input ratio), the GDP is the most available and employed indicator (see, for example, Jankauskas and Šeputienė, 2007; Casey and Christ, 2005; Salinas-Jiménez and Salinas-Jiménez, 2006). For the current analysis, two indicators were obtained from Eurostat (2014): the GDP at current market prices in euros, and in order to take possible differences in purchasing power into account, the GDP at current market prices in the Purchasing Power Standard (PPS) per inhabitant. Regarding the input indicator of labour productivity, both the number of workers and the number of workhours can be chosen. In previous studies, mostly productivity per worker is used (Jankauskas and Šeputienė, 2007; Knack and Keefer, 1997; Hall and Jones, 1999; Ghulam, 2012; Salinas-Jiménez and Salinas-Jiménez, 2006; Casey and Christ, 2005). However, simply counting the workers does not take into account possible part-time workers or overtime, nor the differences in the statutory work week in different countries (OECD, 2001). Hence, for comparison purposes, in this article two measures obtained from Eurostat (2014) are used: the number of employees, and the hours actually worked by the employees per year. All these indicators pertain to the year 2008. By combining these different input and output indicators, four different labour productivity indicators were computed. The correlation coefficients between these four productivity indicators can be seen in Appendix Table A1. As all the correlations are over 0.90, no significant differences can be assumed.

The religion-related data stem from two databases: the European Values Study (EVS) and the European Social Survey (ESS), which among others include various questions concerning religion. The EVS (see EVS, 2010) is a multi-country survey that is repeated every nine years and covers also an increasing number of European countries. Here, the fourth wave (year 2008) is used. The ESS (see ESS, 2008) is a biennial multi-country survey covering an increasing number of European countries. The first round was conducted in 2002 and this article uses the fourth wave (year 2008) data, as for this year data from the EVS were available as well. There are usually 1,000 to 2,000 respondents per country in the case of the EVS and 1,500 to 2,500 respondents per country in the case of the ESS. Also, both surveys provide weights in order to ensure that the regional-level data would be representative of the demographic structure of a country. This offers a good basis for combining these two surveys. Both surveys enable to analyse the regional level as well, as they include respondents from various regions of a particular country. For the regions at the NUTS1 level used in this article, the number of respondents per region was 544.63 on average in the ESS and ranged from 21 to 2,367; in the EVS, the number of respondents per region was 418.67 on average and ranged from 20 to 1,793. The regional-level indicators corresponding to each question used in this article were obtained by aggregating individual-level data using the weights provided by the ESS and EVS. It has to

be mentioned that the number of respondents was quite small in some regions. However, surveys are the best option available for measuring, for example, different religion-related aspects at present.

First, religiosity is described by eight indicators (four from the ESS and four from the EVS). The aim was to include similar questions from both surveys, when available, in order to smooth possible differences in the two surveys. All indicators used can be seen in Appendix Table A1. Based on the initial indicators an exploratory factor analysis (the principal components method) was performed. Although a division has previously been shown, for example by Kaasa (2013), between formal and informal religiosity in a similar analysis at the individual level, here all initial indicators loaded into one factor. A closer look at the indicators showed that there was no significant difference between, for instance, the questions 'How often pray apart from at religious services' and 'How often attend religious services apart from special occasions' (correlation coefficient 0.93). This is in accordance with Kaasa (2015) and Kaasa (2013) showing that at the macro-level the indicators of belonging were very strongly correlated to the other indicators of religiosity. The factor loadings, the percentage of total variance explained by the factor, and the Kaiser-Meyer-Olkin (KMO) measure indicating the appropriateness of the factor model are presented in Appendix Table A2. The share of total variance explained and KMO measure can be viewed as acceptable (values of the KMO measure larger than 0.6 or 0.5 are usually considered as acceptable). The factor scores were saved as a religiosity variable.

Regarding the possible effect of different religious denominations, the Protestantism-Catholicism comparison is often broadened to a more generalised division between hierarchical (Catholicism, Orthodoxy, Islam) and non-hierarchical (Protestantism, Hinduism, Buddhism, etc.) religions (Knack and Keefer, 1997; La Porta et al., 1997). Hence, in order to provide a broader view, in this study the share of those belonging to a hierarchical religion was calculated. In order to smooth possible deviations, this indicator was computed on the basis of the data obtained from both the ESS and EVS (the correlation coefficient between the indicators obtained from the ESS and EVS was 0.95), and then the average of those two indicators was calculated. The same was done for the share of those belonging to a Protestant denomination (the correlation coefficient was 0.96) and it appeared that the share of Protestantism and the share of hierarchical religion are very highly negatively correlated (-0.99). Hence, only the share of hierarchical religion was included into the analysis.

The data about cultural dimensions came from Kaasa et al. (2014), who have created new indicators of cultural dimensions based on Hofstede's (1980) concept using factor analysis and the data from the ESS and EVS for the year 2008 similarly to the factor of religiosity created in this study. Every cultural dimension was based on six initial indicators obtained from both the ESS and the EVS (see Kaasa et al., 2014 for details). There are also data from Hofstede's (1980, 2001) original study available, which are still widely used, but despite culture and values being relatively stable phenomena, four decades have passed since Hofstede's study and it can be assumed that cultures may have changed during this time. In addition, Hofstede's data are available mainly at the country level. The data from Kaasa et al. (2014) are available also at the NUTS 1 level for many European countries.

As the impact of religion on productivity is often explained by the concept of the Protestant work ethic, this aspect is also covered here. Based on the approach used, for example in Inglehart (1994) and Granato et al. (1996), an index of achievement motivation was calculated. For this, the questions from the EVS were used concerning the values people think are important to teach to children. From those values, hard work, thrift and determination are assumed to be related to a strong work ethic. However, as pointed out by Granato et al. (1996), there is a tendency of respondents in some societies to place relatively strong emphasis on all values while in other societies much less emphasis is put on all values. Therefore, similarly to Inglehart (1994) and Granato et al. (1996), the values that can be viewed as discouraging achievement (obedience and religious faith) were also included in the following way. First, three indicators concerning values encouraging

achievement were captured into one indicator using a confirmatory factor analysis and then the same procedure was used for two indicators discouraging achievement. The factor loadings, percentages of total variance explained by the factors, and the Kaiser-Meyer-Olkin (KMO) measures indicating the appropriateness of the factor model are presented in Appendix Table A3. The share of total variance explained and the KMO measure can be viewed as acceptable (in the case of only two indicators, the KMO value is always 0.5 because of the formula used for calculating the KMO measure). The factor scores were saved as variables and then the indicator of achievement motivation was calculated as a difference between the achievement-encouraging and achievement-discouraging factors. The resulting indicator of achievement motivation can be interpreted as showing the relative importance of values encouraging achievement.

As control variables, the indicators reflecting innovation, R&D, and education were used. As a proxy for innovative activities an indicator of patent applications to the EPO by priority year (per million of labour force) was used. R&D activities were described by an indicator of total R&D personnel and researchers (as a percentage of the active population, full time equivalent). (An indicator of R&D expenditures per inhabitant was considered as an alternative, but the indicator of R&D personnel was chosen because of a stronger logical connection with labour productivity. The correlation coefficient of the two R&D indicators was 0.92; therefore no remarkable differences are to be expected.) The education level of a population in a particular region was measured by the percentage of the population aged 25-64 with tertiary education attainment. All these indicators pertain to the year 2008 and were drawn from Eurostat (2014).

Results

The correlation analysis between the productivity indicators and various factors of productivity (see Appendix Table A4) showed significant and strong positive correlations between productivity and all control variables. Also, it appeared that both religiosity and the share of hierarchical religion are negatively related to productivity, although the correlations are statistically insignificant when the GDP in PPS is used. While the negative correlation of productivity with hierarchical religion is in accordance with the expectation of the positive impact of Protestantism, the negative correlation with general religiosity contradicts the expectation of a positive impact of general religiosity accompanied by a strong work ethic. Also, the indicator of achievement motivation reflecting the relative importance of values related to a strong work ethic turned out to have no significant correlation with productivity. Regarding cultural dimensions, power distance, uncertainty avoidance and masculinity, all appeared to have positive relationships and individualism a negative relationship with productivity. The relationships with almost all factors seem to be somewhat stronger when the GDP in euros is used and somewhat smaller when the GDP in PPS is used. This is logical as taking the purchasing power into account usually reduces the differences between the so-called wealthier and poorer countries and regions. This may also explain the different significance concerning the share of hierarchical religion.

Next, in order to shed more light on these relationships regression analysis was used. As it can be seen from Appendix Table A5, some of the productivity factors included into the analysis are moderately or strongly correlated to each other. Regarding possible multicollinearity, the VIF values ranged from 1.06 to 4.90, being lower than the lowest commonly suggested limit: 5 (although limits such as 8 or 10 are also often used). The often-used strategy to capture the strongly related factors into fewer variables with the help of factor analysis was not used here, because the aim here was to analyse different cultural dimensions separately, and to compare the relative importance of different religion-related aspects with each-other and different cultural dimensions. However, it is clear that the regression coefficients may still be influenced by the strong relationships and

the results should be viewed rather as indicating the relative importance of different factors.

The results of the regression analysis for four different indicators of labour productivity are presented in Tables 1-4. For all models, the p-value of the F-statistic was below 0.001. The values of the adjusted R-square increased when explanatory variables were added and these values were somewhat lower when the GDP in PPS was used, as it could be expected considering the lower correlation coefficients in the case of the GDP in PPS shown in Table A4.

First, only control variables were included into the regression (Model 1). Then, religiosity and the share of hierarchical religion were added to the control variables in Model 2 and achievement motivation was added to the control variables in Model 3. All these variables were included in Model 4. Model 5 includes just cultural dimensions in addition to the control variables. In Model 6, religiosity and the share of hierarchical religion was added to the control variables and cultural dimensions. Analogically, in Model 7 achievement motivation was added to the control variables and cultural dimensions. Last, Model 8 includes all productivity factors that are studied in this article.

TABLE 1. STANDARDISED REGRESSION COEFFICIENTS OF THE FACTORS
OF GDP (EUR)/ EMPLOYEES

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Patenting	0.35***	0.37***	0.36***	0.41***	0.08	0.08	0.11	0.11
R&D	0.14	0.10	0.14	0.07	0.12	0.06	0.11	0.05
Tertiary education	0.31***	0.27**	0.29**	0.19	0.08	0.12	0.08	0.11
Religiosity		-0.24**		-0.37***		-0.03		-0.08
Hierarchical religion		0.13		0.17*		0.28***		0.29***
Achievement motivation			0.07	-0.21*			-0.06	-0.06
PDI					-0.26**	-0.30**	-0.23*	-0.29**
UAI					0.02	-0.05	0.00	-0.05
MAS					-0.32***	-0.36***	-0.34***	-0.35**
IND					0.20**	0.26***	0.19**	0.24**
adjusted R Square	0.42	0.44	0.41	0.46	0.57	0.61	0.56	0.61
F-statistic	19.09***	12.70***	14.39***	11.87***	15.02***	14.09***	13.07***	12.58***

Note: *** significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.10 level.

TABLE 2. STANDARDISED REGRESSION COEFFICIENTS OF THE FACTORS
OF GDP (EUR)/ HOURS WORKED

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Patenting	0.48***	0.50***	0.48***	0.53***	0.21	0.20	0.20	0.19
R&D	0.05	0.01	0.05	-0.01	-0.02	-0.07	-0.01	-0.06
Tertiary education	0.27**	0.23*	0.27**	0.18	0.09	0.12	0.09	0.13
Religiosity		-0.26**		-0.34***		-0.07		-0.04
Hierarchical religion		0.15		0.18*		0.31***		0.31***
Achievement motivation			-0.01	-0.13			0.02	0.04
PDI					-0.19*	-0.26*	-0.20*	-0.27*
UAI					-0.14	-0.19	-0.13	-0.19
MAS					-0.26**	-0.27**	-0.25**	-0.28**
IND					0.22**	0.28***	0.23**	0.30***
adjusted R Square	0.43	0.46	0.42	0.47	0.57	0.63	0.57	0.62
F-statistic	20.40***	14.02***	15.10***	12.13***	15.47***	15.15***	13.36***	13.48***

Note: *** significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.10 level.

TABLE 3. STANDARDISED REGRESSION COEFFICIENTS OF THE FACTORS OF GDP (PPS)/ EMPLOYEES

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Patenting	0.25**	0.31**	0.27*	0.35**	0.05	0.05	0.08	0.07
R&D	0.15	0.10	0.15	0.07	0.23	0.15	0.22	0.14
Tertiary education	0.21	0.23*	0.19	0.15	-0.03	0.03	-0.03	0.02
Religiosity		-0.18		-0.31**		-0.01		0.05
Hierarchical religion		0.25**		0.30**		0.40***		0.41***
Achievement motivation			-0.10	-0.21*			-0.08	-0.06
PDI					-0.30*	-0.35*	-0.25*	-0.33*
UAI					0.25	0.16	0.24	0.16
MAS					-0.30**	-0.39**	-0.32**	-0.37**
IND					0.18*	0.28***	0.17*	0.25**
adjusted R Square	0.23	0.26	0.23	0.28	0.33	0.43	0.33	0.43
F-statistic	8.72***	6.27***	6.78***	5.96***	6.28***	7.33***	5.52***	6.54***

Note: *** significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.10 level.

TABLE 4. STANDARDISED REGRESSION COEFFICIENTS OF THE FACTORS OF GDP (PPS)/ HOURS WORKED

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Patenting	0.45***	0.50***	0.45***	0.52***	0.22	0.22	0.20	0.18
R&D	0.04	-0.01	0.04	-0.02	0.03	-0.04	0.04	-0.03
Tertiary education	0.20	0.20	0.20	0.16	0.01	0.06	0.01	0.08
Religiosity		-0.22*		-0.28**		-0.05		0.01
Hierarchical religion		0.24**		0.26**		0.40***		0.39***
Achievement motivation			-0.01	-0.11			0.03	0.08
PDI					-0.21*	-0.27*	-0.23*	-0.30*
UAI					0.02	-0.06	0.03	-0.05
MAS					-0.24**	-0.29**	-0.23*	-0.31**
IND					0.22**	0.30***	0.23**	0.34***
adjusted R Square	0.31	0.34	0.30	0.34	0.39	0.49	0.38	0.49
F-statistic	12.57***	8.91***	9.30***	7.57***	7.99***	9.09***	6.91***	8.16***

Note: *** significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.10 level.

Based on the results, the following generalisations can be made. Regarding control variables, the regression coefficient of patenting appeared to be positive and significant until cultural dimensions were added. The positive relationship of productivity and the share of population with tertiary education is weaker, floating on the edge of statistical significance for all model specifications. The share of those dealing with R&D did not appear to have a statistically significant relationship in any specification.

Next, general religiosity turned out to have a negative statistically significant regression coefficient in most cases until cultural dimensions were added. After that, general religiosity became insignificant for productivity. The results concerning the share of hierarchical religion, however, may be viewed as surprising based on the results of the correlation analysis. Namely, the regression coefficient of the hierarchical religion variable turned out to be positive and they became higher and statistically significant for all productivity indicators after cultural dimensions were added. Still, these results are in accordance with the findings of Islam (2008), who used dummies for different religions

and in the regression analysis of the TFP the dummy for Protestantism appeared to have a statistically significant negative coefficient and the dummy for the Muslim religion appeared to have a positive, although statistically insignificant coefficient. The indicator of achievement motivation appeared to be statistically insignificant for productivity in almost all cases.

With regard to cultural dimensions, individualism appeared to have a positive and statistically significant regression coefficient in all specifications. Similarly, masculinity and power distance show negative and statistically significant regression coefficients in all specifications, although the importance of power distance for productivity seems to be slightly smaller than that of individualism and masculinity. Uncertainty avoidance turned out to be statistically insignificant in all models and for all productivity indicators. Hence, it can be concluded that among those factors included in this analysis, the share of hierarchical religion, individualism, masculinity and power distance are the factors that proved to be significant for labour productivity.

Discussion

The results of the current article provide significant support for the assumption that culture has an impact on productivity. When investigating cultural dimensions based on Hofstede's original concept (1980) with the help of regression analysis, three out of four dimensions turned out to be significant for productivity. Individualism proved to be positively related to labour productivity, confirming the assumption that in individualistic cultures people are more achievement-oriented, more motivated by the expectations for compensation and recognition, and more prone to contribute to the exchange and diffusion of information, as described before. This is also in accordance with the empirical results of Gorodnichenko and Roland (2010). Masculinity turned out to have a negative relationship with productivity. From the two alternative assumptions about the impact of masculinity, the result supports the argument that in more feminine cultures a more supportive climate can be found and the workers feel more relaxed, which in turn helps them to do their best. It is possible that the role of masculine values including the orientation towards success and achievement is to some extent also covered by the individualism factor and therefore the positive impact of feminine values prevailed here. Power distance also proved to be negatively related to productivity, the result being in accordance with the expectations about less initiative and a constrained information diffusion in the case of a large power distance. Although uncertainty avoidance appeared to be negatively related to productivity in the correlation analysis, it appeared to be statistically insignificant in the regression analysis. There are two different argumentations concerning the impact of uncertainty avoidance: it can be assumed to hinder technology improvements by the resistance to everything new and by the reliance on rules, but at the same time, more elaborated rules may provide more security and fewer resources spent on securing oneself against dishonest practices. It may be possible that these two impacts with opposite directions balance each other out. Unfortunately, no empirical studies could be found to compare the results concerning the relationship of labour productivity with masculinity, power distance, or uncertainty avoidance.

Regarding the religion-related aspects, both general religiosity and the achievement motivation indicator that reflected the values describing a strong work ethic often associated with religiosity showed a negative relationship with productivity if significant at all. Hence, the argument of a stronger work ethic and a higher general religiosity promoting productivity did not find any support in this analysis. When looking at the values associated with a strong work ethic, such as hard work, determination and thrift, it is possible that they may not be the best choice on which to focus when aiming for creative solutions for improving technologies. It is possible that at least nowadays creativity and initiative are more important and constructive than hard work and thrift, for example. Both general religiosity and the achievement motivation indicator turned out to

be statistically insignificant after including cultural dimensions. This allows to assume that cultural dimensions such as individualism, masculinity and power distance capture the sources of labour productivity better than religiosity or values associated with religiosity. The assumption of Protestantism having a positive influence and hierarchical religions a negative influence on productivity is also not supported by the results of the current analysis. The results showing a positive relationship of the share of hierarchical religion with productivity may be surprising based on the correlation analysis, but are in accordance with previous empirical evidence (Islam, 2008). When controlling for cultural dimensions, the share of the population belonging to a hierarchical religion appears to be positively related to productivity. Hence, some important characteristics of regions with a higher share of hierarchical religions may be covered by the cultural dimensions. For instance, it is possible that the negative effect of the more hierarchical society is covered by the power distance dimension.

Taking into account the strong relationships between, for example, cultural dimensions and control variables included into this analysis, the results of the regression analysis should not be interpreted as meaning that the development of technology or education are not important at all. The results should be viewed rather as indicating the relative importance of different factors. According to the correlation analysis, uncertainty avoidance, for instance, has a remarkable negative relationship with labour productivity. It cannot be ruled out that uncertainty avoidance still may have a negative impact, but the other three dimensions seem to be more important for productivity.

With regard to policy implications, this article enables to shed some light on the values that appear to foster or hinder productivity. Culture has been viewed as a quite stable phenomenon that does not change rapidly (Williams and McGuire, 2010) and it cannot be assumed that culture can be changed easily. However, it is possible to use the information about the characteristics of cultures that seem to have a positive influence on productivity to map the possible challenges, and to design policies that try to direct the prevailing values in an advantageous direction. A shift in values started from the government sector may well spread to other life domains, including the business sector. For instance, in more collectivistic cultures it may help when the individual achievements would be valued more, or in masculine societies encouraging more supportive attitudes may prove useful. Also, it can be supposed that when the decision making system would be decentralised, this may promote an understanding that initiative is favoured in a society. However, it has to be kept in mind, of course, that culture is expected to change very slowly.

Regarding the limitations of this study, it should be kept in mind that data sources focussing on Europe were used and European regions were analysed. Therefore, conclusions can be drawn for European regions only. Whether the analysed relationships can apply to the whole world, is a topic for future studies when data for a sample larger than Europe become available. Also, data were not available for regions in all European countries in the ESS and EVS, therefore when more complete data become available, it would be interesting to re-run the analysis.

Conclusion

This article explored the possible impact of cultural dimensions and religion-related aspects on labour productivity at the society level. This analysis aimed to fill the gap in the previous literature: there are very few studies empirically analysing the impact of culture or religion on productivity and no studies investigating this topic at the regional level. The data of 78 regions from 22 European countries were analysed. Factor analysis was used to capture the information of initial indicators into variables describing general religiosity and reflecting strong work ethic. Correlation and regression analysis was performed including also control variables describing patenting, R&D activities and the level of education. For comparison purposes four differently calculated productivity indicators were used.

Both the correlation and regression analysis showed individualism to be positively and power distance to be negatively related to labour productivity, confirming the expectations. Masculinity also turned out to be negatively related to productivity, confirming the positive impact of feminine values rather than masculine values. Uncertainty avoidance, although negatively related to productivity according to the correlation analysis, appeared to be insignificant in the regression analysis. Both general religiosity and the achievement motivation indicator capturing the values of a strong work ethic turned out to be insignificant after cultural dimensions were added, indicating that cultural dimensions seem to capture the sources of labour productivity better than religiosity or values associated with religiosity. When controlling for cultural dimensions, the share of those belonging to a hierarchical religion appeared to be positively related to productivity, allowing to assume that some important characteristics of regions with a higher share of hierarchical religions appear to be covered by cultural dimensions. The results did not depend much on the choice of the labour productivity indicator. Regarding the implications of this study, it cannot be assumed that culture can be easily or quickly changed, but it is possible to use the information about the characteristics of cultures that seem to have a positive influence on productivity and to design policies that could shift the prevailing values so that it could have a positive impact on productivity in a longer perspective.

References

- Aldashev G., Platteau J.-P., 2014. "Religion, culture, and development", In: Ginsburgh, V. A., Throsby, D. (Eds), *Handbook of the Economics of Art and Culture*, Vol. 2, Elsevier, Amsterdam, pp.587-631.
- Alesina A., Devleeschauwer A., Easterly W., Kurlat S., Wacziarg R., 2003. "Fractionalization", *Journal of Economic Growth*, 8, pp.155-194.
- Altynbekov A., Abdiraimova G., Kenzhakimova G., Sadyrova M., Abdikerova G., 2013. "The Role of work ethic in the development of Singapore, South Korea, Malaysia, Japan and European countries", *International Journal of Social, Human Science and Engineering*, 7(3), pp.419-423.
- Artige L., Nicolini R., 2006. Labor productivity in Europe: Evidence from a sample of regions. CREPP Working Paper 2006/08.
- Barro R. J., McCleary R. M., 2003. Religion and economic growth. NBER Working Paper Series, No 9682, Cambridge, MA.
- Beugelsdijk S., van Schaik T., 2005. "Social capital and growth in European regions: An empirical test", *European Journal of Political Economy*, 21, pp.301-324.
- Bjørnskov C., Méon P.-G., 2010. The productivity of trust. Centre Emile Bernheim Working Paper, 10/042.
- Casey T., Christ K., 2005. "Social capital and economic performance in the American states", *Social Science Quarterly*, 86(4), pp.826-845.
- Chanchani S., Theivanathampillai P., 2002. Typologies of culture. University of Otago, Department of Accountancy and Business Law Working Papers Series, 04_10/02, University of Otago, Dunedin.
- Chiang F., 2005. "A critical examination of Hofstede's thesis and its application to international reward management", *International Journal of Human Resource Management*, 16(9), 1545-1563.
- Crespi G., Zuñiga P., 2010. Innovation and productivity: Evidence from six Latin American countries. IDB Working Paper Series No.IDB-WP-218.
- Dettori B., Marrocu E., Paci R., 2012. "Total factor productivity, intangible assets and spatial dependence in the European regions", *Regional Studies*, 46, Special Issue: Intangible Assets and Regional Economic Growth, pp.1401-1416.
- ESS, 2008. ESS Round 4: European social survey round 4 data (2008). Data file edition 4.0. Norwegian Social Science Data Services, Norway - Data Archive and distributor of ESS data.
- European Commission. Eurostat, 2012. NUTS - Nomenclature of territorial units for statistics.

- Introduction. Accessed at: http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction (24.09.2013).
- Eurostat, 2014. Database. Accessed at: <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/> (05.01.2014).
- EVS, 2010. European Values Study 2008, 4th wave, Integrated Dataset. GESIS Data Archive, Cologne, Germany, ZA4800 Data File Version 2.0.0 (2010-11-30) doi:10.4232/1.10188.
- Foley R.A., Mirazón Lahr M., 2011. "The evolution of the diversity of cultures", *Philosophical Transactions of The Royal Society B: Biological Sciences*, 366(1567), pp.1080-1089.
- Forson J.A., Janrattanagul J., Carsamer E., 2013. "Culture Matters: A Test of Rationality on Economic Growth", *Asian Social Science*, 9(9), pp.287-300.
- Ghulam M., 2012. Human capital, governance and productivity in Asian Economies. Job Market Paper. Accessed at: https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=res_phd_2013&paper_id=213 (19.11.2014).
- Gooderham P., Nordhaug, O., 2001. "Are cultural differences in Europe on the decline?", *European Business Forum*, 2(8), pp.48-53.
- Gorodnichenko Y., Roland G., 2010. Culture, institutions and the wealth of nations. NBER Working Paper Series, 16368.
- Gorodnichenko Y., Roland G., 2011. Which dimensions of culture matter for long-run growth? *American Economic Review*, 101(3), pp.492-498.
- Grafton R. Q., Kompas T., Owen, P. D., 2002. "Social divergence and productivity: Making a connection", *The Review of Economic Performance and Social Progress*, 2, pp.203-223.
- Grafton R. Q., Kompas T., Owen, P. D., 2004. Productivity, factor accumulation and social networks: theory and evidence. Australian National University, Economics and Environment Network Working Paper EEN0401.
- Granato J., Inglehart R., Leblang D., 1996. "The effect of cultural values on economic development: Theory, hypotheses, and some empirical tests", *American Journal of Political Science*, 40(3), pp.607-631.
- Griffith R., Redding S., Van Reenen, J., 2004. "Mapping the two faces of R&D: Productivity growth in a panel of OECD industries", *The Review of Economics and Statistics*, 86(4), pp.883-895.
- Hall B. H., 2011. Innovation and productivity. NBER Working Paper Series, 17178.
- Hall, R. E., Jones C. I., 1999. Why do some countries produce so much more output per worker than others? *Quarterly Journal of Economics*, 114(1), pp.83-116.
- Hall S., 1980. "Cultural studies: Two paradigms", In: *A reader in contemporary social theory*, ed. N.B. Dirk and S.B. Ortner, 520-38. Princeton, NJ: Princeton University Press
- Halman L., Luijckx R., 2006. "Social capital in contemporary Europe: evidence from the European Social Survey", *Portuguese Journal of Social Science*, 5(1), pp.65-90.
- Herbig P., Dunphy S., 1998. "Culture and innovation", *Cross Cultural Management*, 5(4), pp.13-21.
- Hofstede G., 1980. *Culture's consequences: International differences in work related values*, Sage Publications, Beverly Hills, CA.
- Hofstede G., 1997. *Cultures and organizations: Software of the mind*, 1st ed., McGraw-Hill, New York, NY.
- Hofstede G., 2001. *Culture's Consequences: Comparing values, behaviors, institutions, and organizations across nations*, 2nd ed., Sage Publications, Thousand Oaks, CA.
- House R., Javidan M., Hanges P. and Dorfman P., 2002. "Understanding cultures and implicit leadership theories across the globe: an introduction to project GLOBE", *Journal of World Business*, 37(1), pp.3-10.
- Inglehart R. and Baker W.E., 2000. "Modernization, cultural change, and the persistence of traditional values", *American Sociological Review*, 65(1), pp.19-51.
- Inglehart R., 1994. *The impact of culture on economic development: Theory, hypotheses, and some empirical tests*, Ann Arbor, University of Michigan.
- Isaksson A., 2007. "Determinants of total factor productivity: a literature review", UNIDO

Research and Statistics Branch Staff Working Paper 02/2007.

Islam N., 2008. "Determinants of productivity across Countries: An exploratory analysis", *The Journal of Developing Areas*, 42(1), pp.201-242.

Jankauskas V., Šeputienė J., 2007. "The relation between social capital, governance and economic performance in Europe", *Business: Theory and Practice*, VIII(3), 131-138.

Kaasa A., 2013. "Religion and social capital: Evidence from European countries", *International Review of Sociology*, 23(3), pp.578-596.

Kaasa A., 2015. "Culture, religion and social capital: evidence from European regions", *International Journal of Sociology and Social Policy*, 35(11/12), pp.772-794.

Kaasa A., Vadi M., 2010. "How does culture contribute to innovation? Evidence from European Countries. *Economics of Innovation and New Technology*", 19(7), pp.583-604

Kaasa A., Vadi M., Varblane U., 2013. "European social survey as a source of new cultural dimensions estimates for regions", *International Journal of Cross Cultural Management*, 13(2), pp.137-157.

Kaasa A., Vadi M., Varblane U., 2014. "Regional cultural differences within European countries: Evidence from multi-country surveys", *Management International Review*, 54(6), pp.825-852.

Knack S., Keefer P., 1997. "Does social capital have an economic payoff? A cross-country investigation", *Quarterly Journal of Economics* 112, pp.1251-1288.

La Porta R., Lopez-de-Silanes F., Shleifer A., Vishny R. W., 1997. Trust in large organizations. *The American Economic Review*, 87, Papers and Proceedings of the Hundred and Fourth Annual Meeting of the American Economic, 333-338.

Linz S. J., Chu Y.-W. L., 2013. "Work ethic in formerly socialist economies", *Journal of Economic Psychology*, 39, 185-203.

Mangeloja E., 2008. Implications of the economics of religion to the empirical economic research. University of Jyväskylä, School of Business and Economics Working paper. Accessed at: <http://core.ac.uk/download/pdf/9309696.pdf> (01.06.2014).

McSweeney B., 2002. "Hofstede's model of national cultural differences and their consequences: a triumph of faith - a failure of analysis", *Human Relations*, 55(1), pp.89-118.

Michalopoulos S., 2012. "The origins of ethnolinguistic diversity", *American Economic Review*, 102(4), pp.1508-1539.

OECD, 2001. Measuring Productivity: Measurement of aggregate and industry-level productivity growth. OECD Manual. Accessed at: <http://www.oecd.org/std/productivity-stats/2352458.pdf> (25.01.2014).

Oyserman D., Coon H.M., Kemmelmeier M., 2002. "Rethinking individualism and collectivism: evaluation of theoretical assumptions and meta-analyses", *Psychological Bulletin*, 128(1), 3-72.

Papamarcos S.D., Watson G.W., 2006. "Culture's consequences for economic development: an empirical examination of culture, freedom, and national market performance", *Journal of Global Business and Technology*, 2(1), pp.48-57.

Peters B., Lööf H., Janz N., 2003. "Firm level innovation and productivity: Is there a common story across countries?", *ZEW Discussion Papers*, No.03-26.

Reimer S.H., 1995. "A look at cultural effects on religiosity: a comparison between the United States and Canada", *Journal for the Scientific Study of Religion*, 34(4), pp.445-457.

Salinas-Jiménez M.D., Salinas-Jiménez J., 2006. "Corruption and productivity growth in OECD countries", *ERSA conference papers* No.ersa06p99.

Sayes E., 2011. "Economic and social determinants of productivity; Balancing economic and social explanations", Paper Presented at the Sociological Association of Aotearoa (NZ) Annual Conference 2011.

Schwartz S. H., 2009. "Causes of culture: National differences in cultural embeddedness", In: Gari, A., Mylonas, K. (Eds), *Quod Erat Demonstrandum. From Herodotus' Ethnographic Journeys to Cross-Cultural Research*, Pedio Books Publishing, Athens, pp.1-12.

Schwartz S.H., 1994. "Are there universal aspects in the content and structure of values?", *Journal of Social Issues*, 50(2), pp.19-45.

- Shane S., 1992. "Why do some societies invent more than others?", *Journal of Business Venturing*, 7, pp.29-46.
- Shane S., 1993. "Cultural influences on national rates of innovation", *Journal of Business Venturing*, 8, pp.59-73.
- Sharpe A., 2004. "Exploring the linkages between productivity and social development in market economies", Centre for the Study of Living Standards, CSLS Research Report 2004-02.
- Syversen C., 2011. "What determines productivity?", *Journal of Economic Literature* 49(2), 326-365.
- Tangen S., 2005. "Demystifying productivity and performance", *International Journal of Productivity and Performance Management*, 54(1), pp.34-46.
- van Everdingen Y. M., Waarts E., 2003. "The effect of national culture on the adoption of innovations", *Marketing Letters*, 14(3), pp.217-232.
- van Hoorn A., 2014. "Individualism and the cultural roots of management practices", *Journal of Economic Behavior & Organization*, 99, pp.53-68.
- Waarts E., van Everdingen Y., 2005. "The influence of national culture on the adoption status of innovations: An empirical study of firms across Europe", *European Management Journal*, 23(6): pp.601-610.
- Williams L. K., McGuire S. J., 2010. "Economic creativity and innovation implementation: the entrepreneurial drivers of growth?", Evidence from 63 Countries. *Small Business Economics*, 34(4), pp.391-412.
- Yamamura E., Shin I., 2012. "Heterogeneity, trust, human capital and productivity growth: Decomposition analysis", *Journal of Economics and Econometrics* 55(2), pp.51-77.

Appendix

TABLE A1. CORRELATION COEFFICIENTS OF VARIOUS INDICATORS OF LABOUR PRODUCTIVITY

	GDP (EUR)/ employees	GDP (EUR)/ hours worked	GDP (PPS)/ employees	GDP (PPS)/ hours worked
GDP (EUR)/ employees	1	0.98***	0.95***	0.94***
GDP (EUR)/ hours worked		1	0.92***	0.97***
GDP (PPS)/ employees			1	0.96***
GDP (PPS)/ hours worked				1

Note: *** significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.10 level.

TABLE A2. RESULTS OF THE EXPLORATORY FACTOR ANALYSES
FOR THE INDICATORS OF RELIGIOSITY

Latent variable	Indicators	Factor loadings	Variance explained (%)	KMO Measure of Sampling Adequacy
Religiosity	How often pray apart from religious services, scale 1-7	0.95	85.59	0.90
	How often attend religious services (scale 1-8)	0.95		
	How religious are you, scale 0-10	0.95		
	How often attend religious services apart from special occasions, scale 1-7	0.94		
	Belonging to particular religion or denomination, share of belonging	0.92		
	How important in your life: religion (scale 1-4)	0.91		
	Are you a religious person (scale 1-3)	0.91		
	Do you belong to a religious denomination (share of those belonging)	0.86		

TABLE A3. RESULTS OF THE CONFIRMATORY FACTOR ANALYSES FOR THE FACTORS ENCOURAGING AND DISCOURAGING ACHIEVEMENT

Latent variable	Indicators	Factor loadings	Variance explained (%)	KMO Measure of Sampling Adequacy
Encouraging achievement	Learn children at home: hard work (share of those, for whom it is important)	0.79	51.62	0.58
	Learn children at home: thrift (share of those, for whom it is important)	0.77		
	Learn children at home: determination, perseverance (share of those, for whom it is important)	0.58		
Discouraging achievement	Learn children at home: obedience (share of those, for whom it is important)	0.85	72.97	0.50
	Learn children at home: religious faith (share of those, for whom it is important)	0.85		

TABLE A4. CORRELATION COEFFICIENTS BETWEEN THE FACTORS OF LABOUR PRODUCTIVITY AND VARIOUS PRODUCTIVITY INDICATORS

	GDP (EUR)/ employees	GDP (EUR)/ hours worked	GDP (PPS)/ employees	GDP (PPS)/ hours worked
Patenting	0.56***	0.62***	0.43***	0.55***
R&D	0.60***	0.58***	0.47***	0.49***
Tertiary education	0.51***	0.46***	0.39***	0.37***
Religiosity	-0.45***	-0.44***	-0.28***	-0.32***
Hierarchical religion	-0.25**	-0.24**	-0.06	-0.10
Achievement motivation	-0.08	0.01	-0.11	0.02
PDI	-0.67***	-0.69***	-0.51***	-0.57***
UAI	-0.56***	-0.61***	-0.35***	-0.47***
MAS	-0.63***	-0.61***	-0.46***	-0.48***
IND	0.43***	0.43***	0.41***	0.43***

Note: *** significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.10 level.

TABLE A5. CORRELATION COEFFICIENTS OF VARIOUS FACTORS OF PRODUCTIVITY

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Patenting	1	0.71***	0.34***	-0.28**	-0.31***	0.09	-0.65***	-0.60***	-0.37***	0.38***
2. R&D		1	0.67***	-0.41***	-0.30***	-0.03	-0.59***	-0.61***	-0.48***	0.31***
3. Tertiary education			1	-0.48***	-0.35***	-0.15	-0.52***	-0.34***	-0.49***	0.28**
4. Religiosity				1	0.54***	-0.34***	0.33***	0.43***	0.74***	-0.29***
5. Hierarchical religion					1	-0.02	0.46***	0.40***	0.43***	-0.34***
6. Achievement motivation						1	0.18	-0.13	-0.11	-0.23***
7. PDI							1	0.71***	0.57***	-0.37***
8. UAI								1	0.63***	-0.08
9. MAS									1	-0.14
10. IND										1

Note: *** significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.10 level.