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An essay on the Religious Transition

The macro-economic perspective

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Abstract: This essay surveys and discusses the findings in a larger project. While religion is a qualitative variable of belonging, religiosity is a quantitative variable of intensity. It is a measure of the importance of the religion in all aspects of life. When a country changes from being a low-income county to become a developed country a Religious Transition occurs: The religion persists, but religiosity falls substantially. The Transition is analyzed in two dimensions: In the cross-country dimension, a strong and robust transition is found for a wide range of aspects. In the time-series dimension, one high-quality time-series for a religiosity indicator has been compiled over seven centuries for Denmark. It is the density of churches, which confirms the cross-country findings.

Keywords Religiosity, economic development, transition
JEL classification O11, Z12

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1. Introduction: A study in two dimensions

This essay summarize of a handful of papers in a project showing how religiosity reacts to economic development (section A of references). It distinguishes between *religion* and *religiosity*: Religion is qualitative variable of belonging, which – in the aggregate – is a count of members. *Religiosity* is a measure of the importance of that religion. Thus, it is a quantitative measure of the intensity of the belief, which is an average in the aggregate.

Section 2 covers the theories used. The frame of reference is the applied theory of growth and development. Long-run development has two basic steady states: A *traditional*, where counties are poor and stable, and a *modern*, where countries are wealthy and has moderate grows. The path between the two stages is the Grand Transition. It change the levels of all socio-economic variables, even variables that are far from economic development, such as religiosity. The *Religious Transition* is a substantial fall in religiosity, while most people keep their religion.

Transitions should be analyzed by (long) time-series, but can also be explored in the cross-country data. The equivalence hypothesis claims that transitions are similar in both dimensions. Transitions are large underlying structures in the data, and they are overlaid with many other effects, so data for a broad range of countries or a long time period are needed in the analysis. It is easier to find such data in the cross-country dimension. The papers confirm equivalence of the Religious Transition by studies of both dimensions.

Section 3 surveys the cross-country study. It develops the *R*-variable, by factor analysis of religiosity items in the World Values Surveys. Thus, it is a demand-side measure that is close to the definition. The transition story told by these data is much the same for each item, so it is strong in the *R*-variable. It is two to three times higher in traditional than in modern societies.

Section 4 surveys the time-series study that covers seven centuries for one religiosity proxy, which is the church density per capita. The precise data cover Denmark only, but the story seems to generalize throughout Europe. The proxy falls throughout, but the first 4½ centuries it falls so little that it is dubious if religiosity fell, however, for the last 2½ century the fall is five times. This indicates a corresponding fall in religiosity.

The study of religiosity is replete with priors and economic interests. Also, it has been studied from many perspectives using different terminologies. This may explain the confusion that permits many secularization discussions, as discussed in Section 5.

2. Theory: From the Grand to the Religious Transition

Section 2.1 discusses the Grand Transition, while 2.2 turn to the main link from the Grand to the Religious Transition, and section 2.2 considers data and the equivalence assumption.

2.1 The Grand Transition and the typical transition path

Growth theory starts from a macro production function, with four factors of production, knowledge, A, capital, K, human capital, H, and labor, L, while time is t. With the usual simplifications it is:

(1a) $Y_t = A_t F(K_t, H_t, L_t)$, which per capita is written with small letters

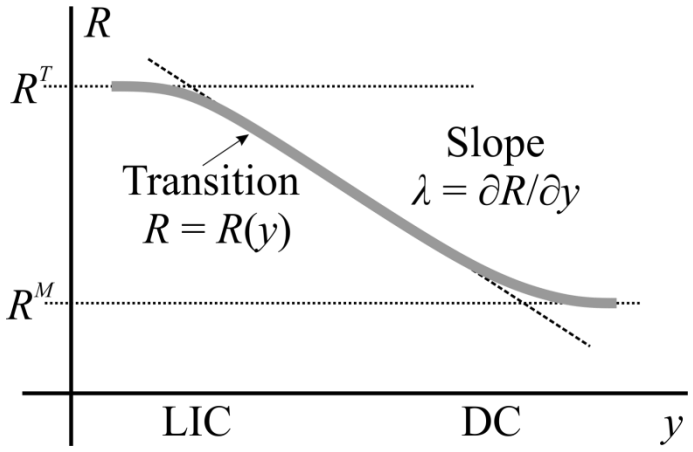
(1b) $y_t = A_t f(k_t, h_t)$, where growth is $g_t = (y_t - y_{t-1})/y_{t-1}$

Growth is driven by the increases in A_t that leads to similarly large increases in both K_t and H_t. Two basic steady states exist, corresponding to two versions of (1):

The *traditional* steady state has an (almost) constant technology, A^T, giving a low and stable income and a stable population as well. Today the closest to the traditional society is the LICs, low-income countries, though most have already started to grow.

The *modern* steady state has a dynamic technology, $A_t^M > A^T$, where the gap between A_t^M and A^T is growing. A_t^M gives high incomes, with moderate growth and a stable population. This is the DCs, developed countries, notably the countries of the West, where modern development started. As DCs come to use the same technology their income converges.

Figure 1. The typical path of a transition, for the variable R



The process of change from one to another steady state is termed a transition, so the one between the two basic steady states is the *Grand Transition*. Today most countries are in that transition, where both technologies co-exist, and development means that the modern sector gradually takes over. During the transition average growth rates are higher, but also more variable; see Gundlach and Paldam (2017). The transition seems to cause transitions in all socioeconomic variables even in fields that are far from the economy such as religiosity.

The first DCs came gradually out of stagnation about 2½ centuries ago, and as no country was much ahead, the transition was a slow process. Today a wide gap exists between LICs and DCs, so there is a world of available technologies the LIC's can learn. Thus, the transition may be fast, but it is fraught with problems and it may stall on the way.

Figure 1 shows the path of a transition variable, R, from the traditional level, R^T, to the modern level, R^M, that is substantially different – the figure shows the case where $R^T > R^M$. The transition has the properties listed in Table 1.

Table 1. The four properties of the transition path: $R = R(y)$

	Property of the path for the national average
T1	It is a non-linear causal relation from income, y, to the variable, R, i.e., $y \rightarrow R$
T2	The path is anchored at both ends: A traditional stable level, R^T, and a modern level, R^M. As income is growing at the modern level, R^M may stabilize rather slowly
T3	The path between R^T and R^M has a (fairly) stable transition slope, $\lambda = \partial R/\partial y$. It is the effect on R of an increase in income by one lp, logarithmic point.
T4	The path explains a substantial part of the variation in R over the full income range, but x is affected by many other factors – especially in the short run.

Note: Income, y, is defined as the (natural) logarithm to GDP per capita, in PPP prices.

The transition is an underlying structure in the data, but it is certainly overlaid with many other processes. The properties (T2) and (T3) from Table 1 predict that the transition path is clearly visible in the scatter of the transition variable over income once the y-data has a *large range*. It also says that the transition only explains some of the variation in the data.

Below we assume that R is a measure of religiosity Section 3 uses a theory-close measure, while section 4 uses a proxy. Both measures have a transition much like Figure 1.

2.2 The Religious Transition[2]

The Grand Transition includes a Religious Transition. It is integrated into the theory of growth when the production function in equation (1) is supplemented with a knowledge equation that explicitly include religious knowledge:

(2a) $A_t = Z_t + \Omega$, which has a secular part, Z_t, and a religious part, Ω.

(2b) $R^A{}_t = \Omega/A_t$, the importance of religion in our knowledge

Equation (2) gives the role of religion as a factor of production, where production is broadly defined, so that it includes healthcare and education, see section 5.2. Religious knowledge, Ω, is roughly constant and has a constant productivity. In traditional society Z is also roughly constant. Thus, also $R^A{}_t \approx R^A$ is almost constant and rather large. The church dominates the production of healthcare and education, which is natural given the large role of Ω in A. Also, the church was the main organization in people's social network, i.e., in their social capital.

In modern society, Z grows steadily, and actually quite fast. This is a key difference between traditional and modern society:

(a) While Z_t increases over time, Ω is roughly constant. For many problems, where one used to have only Ω to rely on, Z_t has proved an effective alternative.

(b) To function in modern society people has to acquire human capital, H_t. Here Z_t comes to play a larger and larger role. This reduces the role of Ω in people's human capital. The growth of Z_t has necessitated a large increase of the education sector, and the teaching of religious knowledge has gradually shrunk.

(c) The growth of Z_t, has allowed the medical profession to treat more diseases, and this has caused a large increase in the health sector. Both the education- and the heath sectors have grown too big to be financed by the alms collected by the Church. Hereby it becomes necessary to find secular alternatives, notably the public sector, which does not have religion as a priority. Thus, institutions are secularized.

(d) The studies of social capital have revealed a great growth in non-religious organizations in the 20th century, such as sports clubs, political organizations and NGOs centered on non-religious purposes. Thus, social capital is secularized.

All these processes of substitution cause the importance of religion to fall. This process is

2. The argument in this section introduces the formal growth model in Gundlach and Paldam (2012), where it is shown that the process where Z_t gradually replaces Ω is an endogenous component of growth.

termed the extra-religious substitution in section 5. However, religion is not only a factor of production, but serves other purposes. It is an important question if the transition has reduced the role in some or in all aspects of life. The 'package' idea discussed in the section 3 and the empirics suggests that the reduction is roughly the same in all fields.

Section 5.2 looks at unofficial religion that is the motley mixture of folk beliefs, superstitions and spirituality of a religious nature, which people may believe in in addition to their formal religion. Many of these beliefs serve the same functions as the official religion, so that the substitution processes discussed should apply equally well.

2.3 The equivalence of the transition in cross-country and time-series data

The transition is a process that lasts a century or two. It should be studied by long time-series, but they are rare, so that transition studies often have to rely on the *equivalence hypothesis*, which says that the LICs today are roughly similar to the present DCs 200 years ago, so that the cross-country pattern mirrors the long-run time-series pattern. Much speaks for equivalence, but it is not fully true because some ideas and technologies, such as mobile phones and trucks, from the DCs are widely used the LICs today. Also, it is a large difference that today the populations in the LICs are growing rather fast.

An ideal religiosity measure for our purpose should cover three dimensions: (D1) many aspects of religiosity, (D2) countries across the full income range, and (D3) a time period that extends over the full transition, i.e., at least 250 years. Time-series covering such a range is rare.

The way to study transitions, such as the Religious Transition, is to make the more detailed analysis in the cross-country dimension, where rich data are available, and confirm as much as possible in the time-series dimension, where one has to struggle to find proxies. The two dimensions are covered in Sections 3 and 4 respectively.

Our explanatory variable for transitions is income that is defined as the natural logarithm to GDP per capita.[3] It is arguable that GDP does not catch all aspects of development. However, if all variables have transitions and the GDP is the aggregate of most of these variables, it is likely that the missing aspects of development will be strongly correlated to GDP as well. Thus, GDP is a good proxy for development, and no alternative measure with a similarly large range is available, anyhow.

3. The logarithmic scale for income is in accordance with welfare and growth theory: People care about relative – not absolute – income increases. Growth theory predicts that the development path of countries is log-linear, so that (2b) is $y_t = \ln A_t + \alpha k_t + \beta h_t$, and growth is the first difference to the logarithmic data.

The GDP-data used are from the rich data set of Maddison, who made great efforts to make prices comparable over time and across countries.[4] One unit of y is a ***lp*** (for logarithmic point). It is a difference of $e \approx 2.7$ times in GDP per capita. The full range is 4-5 lps that is a gap of 50-100 times in GDP per capita between the poorest and the richest countries.[5]

The Maddison data have a cross-country dimension with 161 countries and a time-series dimension of a millennium, but the annual observations start in 1820. Before that the series are trends only. To be complete to 2008 the panel from 1820 should have 161 x 189 = 30,429 observations, but 'only' 12,141 observations are available. This mainly reflects that countries have to be established as an 'entity' to before national account statistics are made.

Transition theory starts from well-known stylized facts about income: Until three hundred years ago countries were in a traditional steady state, where the long-run real growth rates countries were in the range of 0.1% p.a., and income levels of countries differed by less than 1 lp. Then some countries started to grow, and this has gradually spread. Today a growing group of DCs has stable long-run growth rates of +1½% to +2%, and income levels of the DCs have converged so that they differ with less than 1 lp, as they produce with the same international technology. This is the modern steady state that differ from the traditional one by 4-5 lps. Most countries are in transition from the traditional to the modern steady states, so they have a broad range of growth rates and income levels.

4. Angus Maddison (1926-2010) collected his data set for the OECD millennium project, Maddison (2001, 2003). It takes off from the PENN-World tables. The data covers all countries, which had more than half a million inhabitants around year 2000. Maddison updated the data till 2008 one month before he passed away. Now they are updated by a group of economic historians.

5. In market prices the gap is twice as large, so PPP-prices compress income differences by 50%.

3. The cross-country dimension: The polled *R*-variable[6]

The introduction defined religiosity as the importance of religion in *all* aspects of life. This reflects the idea that a religion is a 'package' of beliefs, traditions and prescribed behavior. Religiosity is thus the average size of the 'use' of the different parts of the package.[7] A stable religion means that the package is consumed in *fixed relations*. This is not the case for the individual, but our analysis looks at national averages, i.e., averages for each poll, and finds considerable stability.

The *R*-variable uses averages of polls from the *World Values Surveys*, which covers the three dimensions: (D1) 14 items for different aspects of the importance of religion. (D2) 95 countries over the whole income range from LICs to DCs. (D3) 24 years divided in 5 waves. The *R*-score does well on (D1) and (D2), but poorly on (D3).

Section 3.1 discusses our cross-country *R-score*, while Section 3.2 shows how the pattern in the *R*-data looks. Section 3.3 considers the two main outliers, China and the USA, and section 3.4 reviews a test for causality that shows that income causes religiosity.

3.1 The R-score: A theory-near measure of religiosity

The panel has 95 *x* 5 = 475 cells, but it is an incomplete panel as only 240 cells are filled. The average WVS poll has about 1,200 respondents. Many studies of polls show that stochastic measurement errors in such polls are in the order of 2-5%. The measurement error of the average of 14 polled items is smaller.[8]

The original master version of the WVS questionnaire is in English. We use the terms of that version. It has been translated to be relevant across countries and cultures by a large and competent multinational team. The translation surely adds some noise, but it appears to be stochastic. The master version was made for a country with mainly monotheistic religions, so it may not apply equally well in East Asia. The *R*-level in the East Asian countries is actually lower. However, the transition slope is the same as in the West.

R is calculated as a double average: The first average is over all respondents to one item in one poll, which covers one country at one point in time. It is the share, in percent, of

6. The papers surveyed are Paldam and Gundlach (2012 and 2013).
7. Our estimate of the transition slope generalizes McCleary and Barro (2006). Our results have already been replicated by Opfinger (2011). Also, using a different approach on other data, the same result has been reached by Abrams, Yaple and Wiener (2011).
8. If measurement errors were similar and independent across the 14 items the error on the aggregate *R* would fall by $\sqrt{14}$, but neither assumption is likely to hold fully, so the reduction is smaller.

those who give a high religiosity answer, and hence it is a number between 0 and 100.[9]

The second average is a weighted average of the 14 (or less) items included in the poll, so *R* is in percent as well. Factor analysis is used to extract the best set of weights. An independent factor analysis is made of each wave. One factor dominated in all waves, it is the same factor, and it loads highly and positively to all items. It is chosen as the *R*-variable.

The robustness of the *R*-measure is analyzed by the cross-wave stability of the pattern. As it is satisfactory, it confirms our fixed relations claim. The weights used to calculate the *R*s are the principal components corresponding to that factor. It may sound complicated, but it is the standard way to extract a *latent variable* – such as religiosity – from a set of polls.

The fixed relations have two consequences: (i) It means that *R* is robust to changes in the items included in the aggregation. This is important as the WVS often leave out one item or another in a wave. (ii) For the time-series study where data are much scarcer, it means that if one time-series for an important part of the package can be found, it can be used as a proxy for all other aspects. The fixed relation result will reappear as claim (C2) in section 4.2.

The 240 *R*-values are reported in Paldam and Gundlach (2013). Each *R* is for one country and one year (wave). The *average* – which is the third average – of all 240 *R*s is 56.2, so a little more than half of the respondents declare themselves 'seriously' religious.

Most religions demand exclusivity, though they often absorb older traditions such as the celebration of the shortest day on the Northern hemisphere. Only in East Asia religions are tolerant to each other so that it is accepted that people have more at the same time.

However, it is common that people, who adhere to an exclusive religion, also have other beliefs of a religious nature, cf. section 5 below. A Christian may put some trust in astrology, or visit a palm reader, and so may a Muslim. Most poor countries have many healers and fortune tellers, and there are some too in wealthy countries. Also, 'leftovers' from older religions tend to linger on surprisingly long. The religiosity items used by the WVS are careful not to mention any religion, when they ask about the intensity of the beliefs. Thus, they probably catch some unofficial beliefs as well, but how much they catch is unknown.

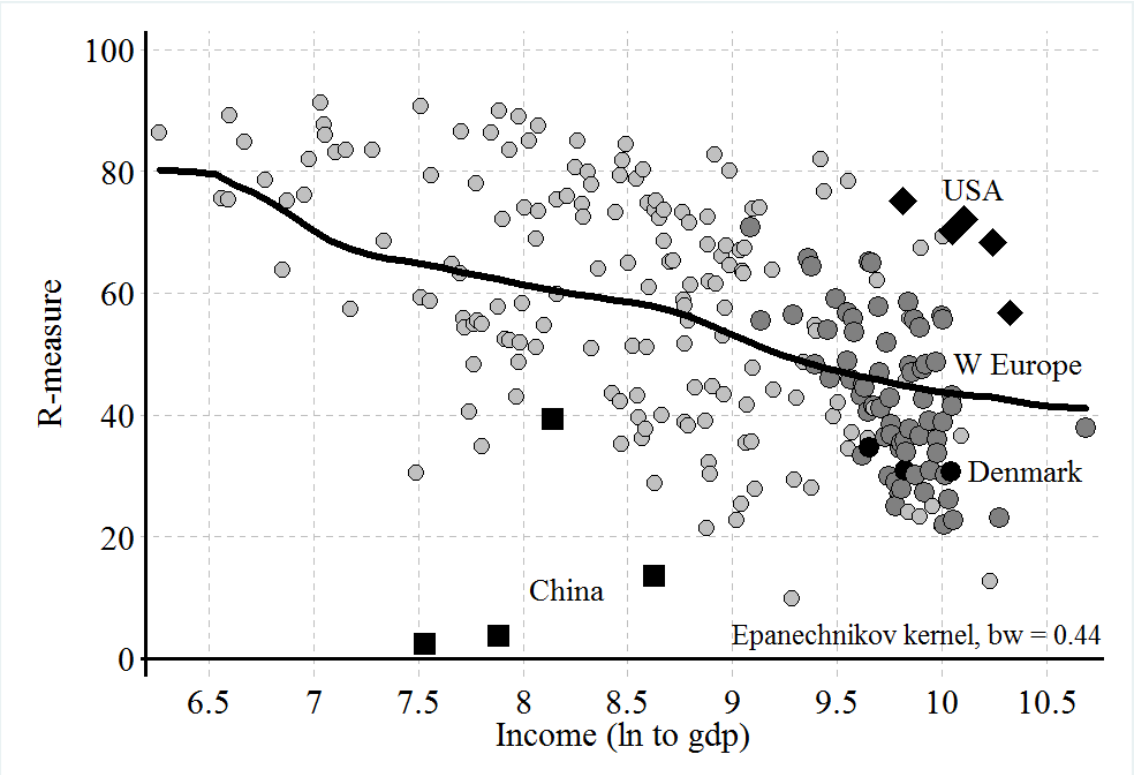
3.2 A look at the data: The (R, y)-scatter and some regressions

The (*R*, *y*)-scatter plot of Figure 2 shows how the 240 observations look. They have a correlation with income of -0.52, so the downward trend in the data is highly significant. The

9. One item asks: 'How important is God in your life'. The answer has 10 categories – respondents choosing one of the three highest categories are considered 'religious'.

kernel-curve drawn is a continuous moving average with a fixed bandwidth. The curve shows that when income rises with 4 lps (from 6.5 to 10.5) religiosity falls from about 80 to 40 *R*-points, so it falls by 10 pp for each *y*-point. This gives a casual estimate of the transition slope, $\lambda \approx -10$, which only differs marginally from the estimates reported section 3.3.

Figure 2. The scatter of religiosity, *R*, over income, *y*, *N* = 240



Note: Figure from Paldam and Gundlach (2013). The curve is a kernel regression, which is a smoothed moving average with a fixed bandwidth.

West European countries are indicated with larger and darker gray circles. China and the USA are also singled out on the graph – they are discussed in section 3.4. Section 4 looks at data for Denmark, so for comparison the three Danish observations, are black circles. They have an average around 30. If we assume that $R \approx 80$ in the traditional society 2½ centuries ago the fall since then is 2.7 times. The last point is from year 2000, and other information suggests that the fall has continued, so it is set to 3 times below.

An important issue is how far the fall will go. It is obvious that the level of religiosity has not yet stabilized. There are signs that the fall is decreasing, but these processes have long lags, so it is difficult to estimate, where stability will occur. The kernel-curve has an almost (log) linear path, so it makes sense to estimate the Religious Transition with a (log) linear

regression, where R is linear and y is in logs:

(1) $R_i = \delta + \lambda\, y_i + [\gamma_1 z_{1i} + \ldots + \gamma_n z_{ni}] + \varepsilon_i$, where λ is a measure of 'correlation' between R and y, δ is a constant, and ε is the noise in the estimate.

If (1) is estimated without the []-bracket, it is termed the *base model*. It catches only the transition, so the unexplained part of the (R, y)-relation is large (see Figure 1) – it actually explains only about 50% of the variation in the data.

The []-bracket contains n control variables for outliers, country groups and religions. The paper reports a set of systematic regression experiments with these controls. They explain about $^2/_3$ of the remaining variation. The experiments serve two purposes:

(1) The coefficients to the controls are interesting in themselves. Some examples are: The raw data show that Western countries are less religious, but the regression including income shows that this is only due to the high income in the West. The countries in East Asia are less religious, but the transition slope is the same. Controlling for income Religiosity in the US is twice the one in Scandinavia.

(2) By varying the controls the robustness of the estimated transition slope λ can be analyzed. Nearly all such experiments find λs between −10 and −12. So when income rises with 1 lp, religiosity falls by about 11 pp – the transition slope $\lambda \approx -11$ ($\pm$1.5).

An alternative robustness test has been made by systematically deleting each country and re-estimating the base equation to calculate the deletion effect. It is normally distributed with a small standard deviation so it confirms robustness. These calculations serve two additional purposes:

(a) It points to outliers, as discussed in the next section. (b) It allows a study of the effects of the measurement bias that may occur if respondents in some countries misrepresent their religiosity. The main suspects are authoritarian anti-clerical countries (as China and Vietnam) where respondents may under-report their religiosity, and authoritarian religious states (such as Iran and Saudi Arabia) where respondents may over-report their religiosity. It proves that the effect of deleting these countries is small.

3.3 Two big outliers: China and USA

On Figure 2 China is marked by black squares. They show that China is exceptionally irreligious. It is not difficult to explain China: all East Asian countries have low religiosity, and in addition China has an authoritarian anti-clerical regime.

The USA is marked by black diamonds showing high religiosity. The pattern over time is typical, but the level for the *R*-score is almost 20 points above the trend, though recent polls indicate a movement towards the trend, see PEW (2015). The well-known explanation of Ianaccone (1991) is based upon the observation that the USA has a large number of churches in fierce competition. Thus, churches make an extra effort. This explanation fails to generalize – there is no connection between the Herfidahl index of religious diversification and religiosity in cross-country data, cf. Opfinger (2011). However, the big inflow of new immigrants from poor countries with high religiosity surely matters. Also, in the past the US received many immigrants from strongly religious minorities, who valued the freedom to practice as they wished.

3.4 The DP-test for causality: Income causes religiosity

The estimates of λ discussed so far mainly reflect the 'correlation' between *R* and *y*. It might be due to two causal relations: (c1) *y* ➔ *R*, when *y* goes up religiosity falls. (c2) *R* ➔ *y*, less religious countries grow faster.[10] The effect, λ, from equation (1) is estimated as if we knew that (c1) was true, but perhaps (c2) also works, so that λ reflects a mixture of (c1) and (c2). In that case we say that the estimate of λ has a simultaneity bias.

The standard way to sort out causality is to run a *two stage instrument regression*. It needs variables $x_1, \ldots, x_k$ that can explain *y*, but are independent of *R*. These variables are used as instruments in the first stage regression:

(2) $y_i = \alpha_0 + \alpha_1 x_{1i} + \ldots + \alpha_k x_{ki} + \varepsilon_i$. It is used to calculate $y_i^{IV} = \alpha_0 + \alpha_1 x_{1i} + \ldots + \alpha_k x_{ki}$

Here y^{IV} is the instrumented income variable. The causal effect of *y* on *R* is then estimated by the following second stage regression:

(3) $R_i = \delta + \lambda^{IV} y_i^{IV} + \varepsilon_i$, where λ^{IV} estimates the causality from *y* to *R*.

The whole method hinges upon the quality of the instruments. Only 'valid' instruments sort out the causality, and 'weak' instruments only catch some of the causal effect. A whole family of tests has been developed to assess the validity and strength of the instruments. Most economists also want their instruments to be 'believable'; i.e., to have a good theoretical

10. It appears that Mustafa Kemal Atatürk secularized Turkey in order to get development, see Armstrong (1933). It is easy to argue that he succeeded, though Turkey is now experiencing a backlash.

justification. As the reader may imagine, it is notoriously difficult to find valid, strong and believable instruments.

Religions are old and have roots that are still older. They influence the culture of countries profoundly; so many channels exist between religions and development. For instruments to be convincing they should have a longer time span than the religions, including all roots. Thus, they have to reach back much before modern economic development. What is needed is instruments for the nature-given *development potential* (DP) of countries in the very long run. Our causality estimates are IV regressions using such instruments:

The DP-instruments used are a set of biogeographical variables developed by Olsson and Hibbs (2005). They try to catch the development potential of countries in Neolithic times about 10,000 years ago by measuring the availability of arable plants and domesticable animals in historical times and for the climatic and geographic conditions, allowing agriculture and trade in goods and ideas to develop. These variables work surprisingly well to explain the present cross-country pattern of incomes. By the standard tests they are valid and strong instruments. The DP-test was developed in Gundlach and Paldam (2009).

When the test is applied to the (R, y)-relations it shows strong causality from y to R. The most amazing result is that the estimate of λ from equation (1) is roughly the same as the estimate of λ^{IV} from equation (3). Thus, the long-run correlation between the two variables found by inspection of Figure 2 and regression (1) is largely causal: $y \rightarrow R$.

Consequently, both the R-measure itself and the key result are robust. If the reader accepts our definition of religiosity, it is quite clear what it shows.

4. The time-series dimension: The church density proxy[11]

The religiosity proxy used is the per capita density of churches in Denmark.[12] These data covers 715 years every 5th year for one country. As regards the three dimensions: (D1) the data covers only one *aspects* of religiosity and (D2) one country only; but (D3) they cover many *years*. Thus, the proxy does poorly on (D1), mixed on (D2) and unusually well on (D3).

The proxy tell a clear story: For the first 450 years of traditional society the densities fall, but so little that it is unclear if religiosity falls. However, when the Grand Transition starts there is a kink, and in the 250 years since then the densities has fallen no less than five times, and in addition the capacity utilization of the churches has fallen.[13] This points to a large fall in religiosity.

Section 4.1 introduces the new church stock data, while section 4.2 looks at the per capital church density data and argues that they are a good proxy for religiosity.

4.1 The church stock data: The number and size of churches

We have coded two data-sets allowing us to calculate a third set:

(i) The Church runs a portal with home pages for all existing churches. This data-set is our master-list of present churches. It is an exact list.

(ii) The Danish National Museum has published a small library documenting the history of all Danish churches in considerable detail. This project started in 1927 and is only 2/3 finished. It gives the historical sample.

(iii) By combining (i) and (ii) we have projected the historical sample to the full country.

Hereby we have reached a time-series for the number of present and past churches in Denmark with an observation every fifth year since year 1300; see Paldam and Paldam (2017). Also, we have some measures of population, it is based on trend before 1750, but it allows us to assess the church densities.

The reader should know that until recently more than 98% of all Danes had the same

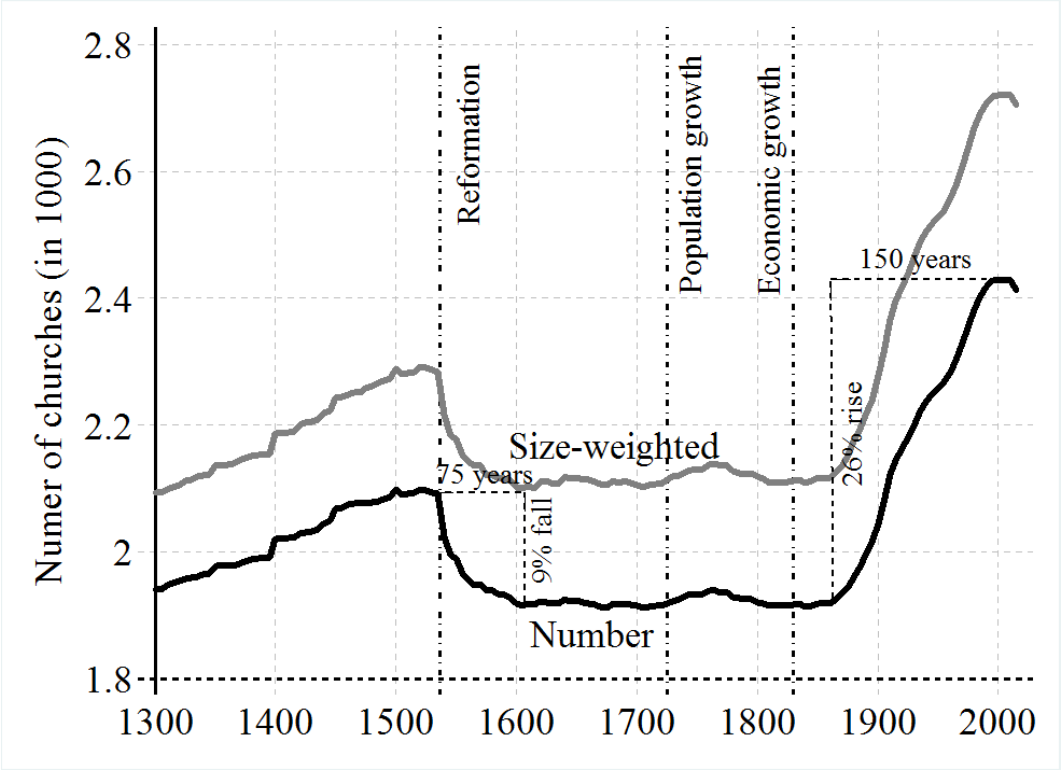
11. The papers surveyed are Paldam and Paldam (2017a and 2017b).
12. The data cover the area of present Denmark, and do not include the Faroes and Greenland.
13. The size of the average church has increased by 2% since the start of the transition, while the capacity utilization has dropped to about half, so the fall in density is not due to an increase in church effectiveness.

religion,[14] though the denomination changed by the Reformation from Catholicism to Lutheranism in 1536. Paldam (2017) discusses the Reformation.

In 1300 the Church had 1,986 churches – today the number is 2,394. This is an increase of 21% over the 7 centuries or 0.003% per year. In the 700 year period 924 churches have been built and 516 have closed. The latter number is important as it shows that it is doable to close churches. Figure 3 shows the path of these data.

The stock is stationary from 1300 to 1860. It increases a little in Catholic time, and an adjustment takes place after the Reformation. Here the church stock falls by 9% over a 75-year period. The path of the fall looks like a standard capital stock adjustment, which is large in the beginning and then tapers off. It is, however, a very slow adjustment. From 1860 an increase of 26% starts.

Figure 3. The stock of churches in Denmark since year 1300, 5-year period



Note: Figure from Paldam and Paldam (2017a). The size weights are 1, 2 and 3 for small, middle sized and large churches. The horizontal axis intersects the vertical axis at 1800 churches. This makes the small movements of the curve look large.

14. Freedom of religion was introduced by the democratic constitution of 1849. However, the constitution gave the Lutheran Church an unclear semi-official status as the *People's Church*.

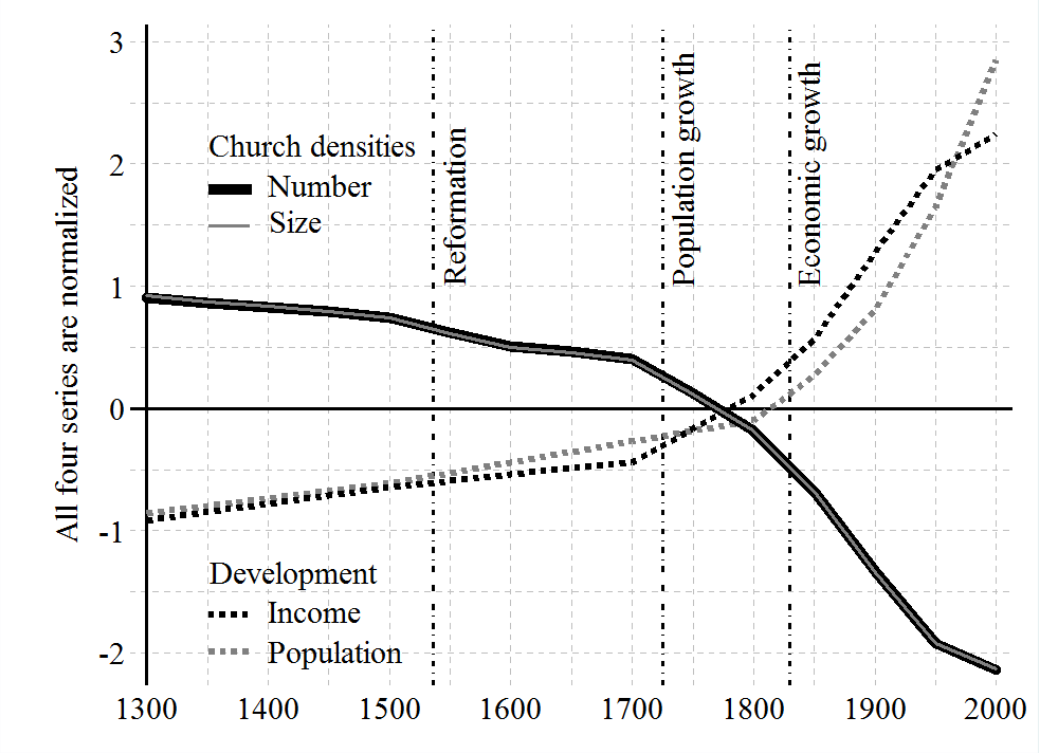
4.2 The church density as a proxy for religiosity

The number of churches per capita is the church density. It is a good proxy for religiosity provided that two claims (C1), and (C2) hold true:

(C1) The church density is a supply side variable, but economic theory says that it must be driven by demand, e.g., determined by the amount of churchgoing. The church stock is a large part of the capital stock used in the production of religion. The way a stock adjusts to variations in demand is modeled by the stock adjustment model of investment. In the short run the adjustment is in the capacity utilization – i.e., the church capacity can be more or less used. In the longer run the stock adjusts. Today churches are seriously underused, and a process of church closings has started.

(C2) Within the same religion the major 'parts' of the package are consumed proportionally. Section 3.1 showed that this holds amazingly well at the macro level, so that a major part – such as churchgoing can be used as a proxy for the whole package.

Figure 4. Long-run trends in income, population and the church density, 50-year period



Notes: All four series are normalized to zero mean and a standard deviation of one. The normalized densities have a perfect overlap, so to depict both series they have a different width. Both density series are in logarithms. *P* is population in millions. The population reached 1 million just before year 1800. Income y is defined as the logarithm to GDP per capita in PPP-prices. Source: Paldam and Paldam (2017a).

It is important that (C1) works in the longer run only, while (C2) works in the aggregate only. The density proxy has some measurement uncertainty for three reasons: (a) While the church stock is rather well measured, population is only similarly well measured after 1750. (b) Transport became cheaper as the forest cover was reduced and roads were improved, thus churches could be used more effectively. (c) The fixed proportions will surely move a little over seven centuries.

The development in income and population is compared with the church densities on Figure 4 that uses a 50-year time interval. All four series show a very parallel development. However, while the development series are slowly growing before the transition and then start to grow faster the density series have the reverse slopes.

The traditional steady state was before 1750, where we have 450 years of observations. Here the density decreased by 1.5 times or 0.12% per year. If the fall due to the Reformation is deducted, the rest of the fall is 0.10%. Due to the measurement uncertainty, we assess that the fall in religiosity is insignificant, and conclude that during the traditional period religiosity was high and roughly constant.

The modern steady state starts to develop a little before 1750, and at that time the density curve has a downward kink and a large fall sets in, as explained in section 2. The fall is 5 times since 1750. This is 0.7% per year. Most of the fall occurs after 1800. From 1750 population becomes much better known. Thus, it appears that modern economic growth started by population growth just before 1750. Historical national accounts start only in 1820, but the years from 1805 to 1820 was a period of economic crisis in the country. Modern economic growth started around 1830, and in 1850 it is clear that something had happened.

By comparing Figures 3a and 3b it is obvious that the big kink upwards in income and population was accompanied by a similarly big downward kink in the two church density series. Some data suggests that at the end of the 17th century church attendance was high (such as 30-50%), and that at middle of the 18th century only about 10% of the population regularly attended services. Modern data show that it is about 2-3%.

Many studies exist of the (high) social capital in Denmark. Before the transition the Church was crucial for social capital in Denmark, but today the Church plays a small role in the social life of most Danes. Most of the organizations that facilitate/generate the social capital are less than 100 years old.

The church staff has fallen from 3.3% of the labor force in Catholic time to 2.4% before the transition. Now it is 0.3%. The dramatic fall is reflected in the educational system.

Aarhus University (with 40,000 students) has abolished the faculty of theology, and even the department of theology. Some (mainly female) students still study for a degree in theology so that they may become priests, but the fraction of students studying theology has dropped below 1% of the student population.

4.4 The development in Denmark seems to generalize

The present section explains three robust facts: (1) most Danish churches are from (long) before the Grand Transition, where (2) the population increased 6 times, and (3) churches are seriously under-crowded today.

These facts seem to apply to all European countries, though there are some variations to the story in each country. In Eastern Europe it was speeded up by half a century of (anticlerical) communist rule, so it is a more complex story, where a (partial) return to the long run trend has occurred. However, the basic story appears to be much the same.

The same story cannot be told about the four overseas Western countries. In 1820 the populations of Australia, Canada, New Zealand and the USA were 0.3, 0.8, 0.1 and 10 million respectively. The large scale immigration since then has greatly changed the ethno-religious composition of these countries, so long-run time-series of religiosity make little sense. Also, many of the new immigrants are from countries closer to the traditional stage of development, where religiosity is high.

An important part of the story in many European countries is the dominating status of the 1-2 national churches. The formal monopoly was abolished when religious freedom was introduced by the democratic constitutions that swept the continent about 1½ century ago. However, traditions are strong in the field of religion.

Thus, the data we have analyzed both in the cross-country and time-series dimensions finds strong evidence for the Religious Transition. It appears that while religions prevail, religiosity falls strongly. The fall is only 3 times in the cross-country measure, while it is more than 5 times in the time-series. This may be due the conceptual difference in the measures, but the next section suggests that some of the difference may be real.

5. Arguments and data on secularization

Above it has been shown that a strong Religious Transition has occurred the last two centuries in the developed world, and that poor countries are much more religious then wealthy ones. This is probably what most people mean by secularization. The basic facts are clear, but some *secularization controversies* persist, see Paldam and Paldam (2017).

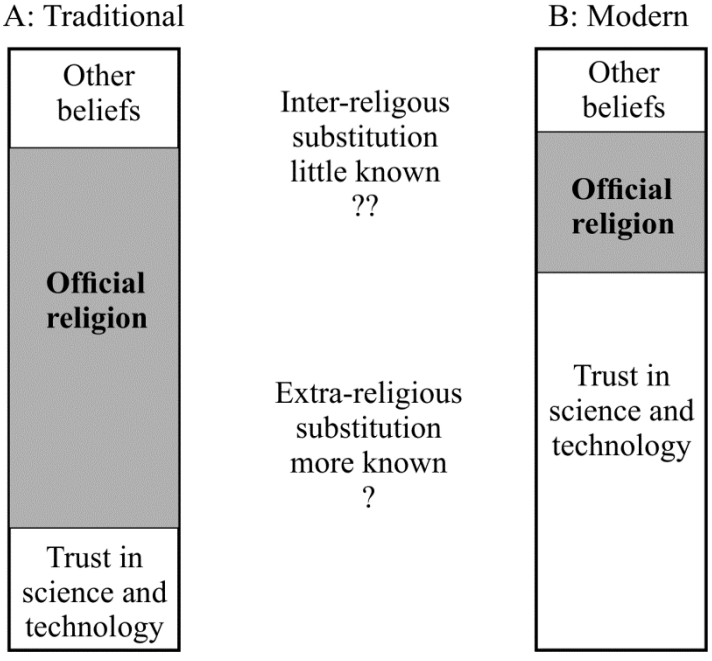
Section 5.1 considers the pattern of substitutions when official religiosity falls, while section 5.2 looks at the category of 'other beliefs'.

5.1 The two margins of substitution

Let us imagine that everything we might use religion for is drawn as a box, and let us further imagine that this box is of a similar size in traditional and modern society. This gives a picture like Figure 5 that shows the large fall in official religiosity. It leaves a void that will be filled in the two ways shown:

The process of extra-religious substitution is shown at the bottom. It is the processes of the Religious Transition discussed above. Here religion is replaced by secular alternatives. At the top is the inter-religious substitution. It deals with the relation between the official religion and other beliefs.

Figure 5. The pattern of substitution: The Danish example



In the case of Denmark, the church density proxy only covers the Church of Denmark, but some data also exists for other formal religions: Catholicism, Islam, Hinduism, etc., which have grown, but not enough to change the main picture.

However *other beliefs* also include informal religion: The spectrum of folk beliefs, superstitions and spiritualities, which are not a full religion, but beliefs of a religious character that has no base in neither science nor in the theology of a formal religion.

Some of the other beliefs are probably caught by the WVS-surveys as discussed in section 3, but not by the church proxy discussed in section 4. This may partly explain why the fall is larger in the time-series than in the cross-country data.

5.2 The red herring of the secularization debates?

The anti-secularization side in the discussion rarely denies that there has been a fall in official religiosity – at least in Europe – but it often claims that there has been a corresponding increase in other beliefs, while the theory of the Religious Transition claims that they have fallen as well. Data for other beliefs are weak, and in particular it appears that no time series exists. Thus, it is a field that is well-suited for controversies.

These beliefs are of at least three types: (i) Mystic ways to predict the future. (ii) Alternative healthcare. (iii) Spiritualities aimed at obtaining existential insight. Such activities are often organized as businesses that want to attract customers, so they have to be visible.

(i) Covers astrology, palm readers, crystal balls, dancing tables, etc. It is a small and decreasing activity.[15] And it is surely much smaller than what one see in LDCs.

(i) In pre-transition countries, the official health system is small, and few effective cures were available for most diseases (Porter 1997), so people had to turn to 'wise' men and women, who used herbal cures supplemented with magic and communications with spirits.[16] In modern society the official health system is greatly expanded, and can cure many diseases. It cannot cure everything so there is still some scope for alternative medicine, but it is hard to imagine that it has not decreased.[17] The scope is larger as regards mental health, and people

15. The Danish telephone directory (Krak) contains 53 astrologists and 33 palm readers, etc.

16. 'Western' science is quite keen to test such cures systematically, but it is difficult as placebo effects are large, see e.g. Paldam and Schjødt (2016). If such cures are deemed to have only placebo effects, and no harmful side effects are found, they are normally allowed and used by alternative practitioners.

17. About 500 (Danish) telephone entries are to healers, where the fraction of alternative cures is high. It is a problem for the search that firms often appears under different entries. Some physicians also use various alternative therapies, such as acupuncture, etc. The Danish phone directory has 215 entries under 'mindfulness'. Most of these are to ordinary phycologists/therapists, who just use a new catchy term to attract customers. Even

in private practice as psychologists/psychotherapists often seem to supply extra offers of treatment of an alternative nature. It is clear that unofficial religiosity connected with health is much reduced compared with the pre-transition period.

(iii) However, while old unofficial beliefs are falling new ones have appeared. They are often lumped together under the vague term of *spirituality*. Some authors find evidence that it is a substantial part of religiosity today; see Heelas and Woodhead (2005), see however Ahlin (2015). It is characteristic that most of these beliefs are quite vague and do not contain supernatural beings. The believers do not see them as religious, but as slightly mysterious techniques for obtaining 'existential insights' that originate outside the 'narrow confines' of 'western' science. They represent oriental wisdom, shamanism, etc. Also, they often have a commercial element.

In Denmark the Center for Contemporary Religions at Aarhus University has tried to count everybody working in unofficial religiosity, for some of the country only. By upward projection it appears that about 1500 people work in the sector. This is less than 20% of the Church staff, so it is not a major activity, and it seems to fall as well, but the falls is probably smaller than the fall in official religiosity.

The big change in the belief system of the West is the extra-religious substitution. Most of the use of religion (broadly defined) in connection with healthcare has been replaced by the vastly expanded lay system of healthcare that is based on modern medicine. In the same way farmers and fishermen have largely moved from relying on divine help to get a good harvest, to rely on modern technology.

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if we add everything up to 2,000 alternative health practitioners, it should be compared to the 212,000 people working in secular healthcare.

6. Conclusion: The Religious Transition

I have lived several years in a couple of less developed countries and traveled in many. This has given me a strong impression that religion – both official and unofficial – plays a much bigger role in the life of people in LICs than it does in the DCs. Also, I have noted that most churches in the European countries are from before the big increase in population known as the Demographic Transition, so the number of churches per capita has fallen dramatically. In spite of this European churches are seriously underused. These impressions have led to the papers surveyed above. They look at both the cross-country and at the time-series evidence.

The cross-country impression has been confirmed using a simple common sense definition of religiosity: It is the importance of religion in all aspects of life. The theoretical definition has been applied to the 14 most relevant items in the largest cross-country data set on people's beliefs and values – the World Values Survey. The average at each poll for *all* these religiosity items falls significantly with income. When they are compiled into a general index, it falls to half due to the transition – the fall has slowed, but not ceased, in the wealthy countries of Western Europe. My assessment is that when the transition is done the fall will have reached one third of the pre-transition value.

The time-series observation has been confirmed by detailed high-quality evidence for the stock and density of churches in Denmark over the last seven centuries. It is taken to reflect demand and hence to be a crude proxy for religiosity. These data show a transition that is even larger than the one in the cross-country evidence. As mentioned this seems to generalize to other European countries.

Thus, the papers have shown a *Religious Transition:* It happens when countries go through the Grand Transition from the poor traditional state to become a wealthy modern one. While religions persist, religiosity falls by a factor of 3-5.

It is not a defense of religions to deny these facts. It is much better for all interested to address the facts. Once they are accepted, many interesting subjects can be discussed such as: What is the path of the fall? How far will it go? How can the outliers such as the USA be explained? Can churches reverse the trend? Will development eventually undermine religious extremism, or will it make a small group more extreme? Such questions deal with important issues for churches as well as for society at large.

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