August 1, 2017

The Religious Transition in Denmark, 1750-2015

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Abstract: Three main variables are considered: Religiosity *inside* the Church of Denmark; religiosity *outside* the Church; and *secular* alternatives. The Grand Transition making Denmark wealthy started about 1750. Since then inside religiosity has fallen five times. Outside religiosity is smaller, and it has dropped as well. Thus, total religiosity has fallen substantially. This is the Religious Transition. Total religiosity has been replaced by a similar increase in the non-religious alternatives, which is the vastly expanded body of scientific and technical knowledge. In addition, religious institutions within health, education and social protection have been squeezed almost to zero by the greatly expanded welfare state that makes an effort to be neutral as regards religions. This has happened in spite of the fact that 76% of the Danes remain Church members.

Keywords: Long time-series, the Religious Transition, modernity and secularization

Note: Our Church Project (references) has a home page where the papers of the project and the data are posted. Most of the Danish sources cited are in Danish. Our translation to English is in {}, and when an English word (e.g. for an institution) needs a Danish translation it is in []. An early version was presented at the Society for the Scientific Study of Religion's 2015 Meeting, Los Angeles

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1. Introduction: Beliefs and institutions in society

The paper quantifies three complex concepts into measurable variables and assesses their development since 1750: (1) Religiosity within the Church of Denmark [Folkekirken]; (2) Religiosity outside the Church of two kinds: (2a) other religions and (2b) other beliefs of a religious nature that do not constitute a full religion; and (3) secular alternatives. These variables are listed in Table 1.

Before 1750, the country was in the *traditional* steady state, where both the population and the economy were almost stable. *Modern* development started in Denmark about 1750 by an upward kink in the population growth rate. Since then the population has grown 6.5 times and the production per capita has increased 21 times, so the real GDP has increased 136 times. This is the *Grand Transition*, which has changed the country profoundly.

The paper considers the *Religious Transition*, which is one part of this change. It consists of a moderate fall in religious membership, and a large fall in religiosity. The key change in the Religious Transition is the extra-religious substitution, where religiosity falls and secular alternatives increases. There is also some inter-religious substitution between inside and outside religiosity, but it found to be a rather modest sideshow.

We use the following operationalized definitions: A *Church* is an organization that produces a religion, which is a 'package' of tradition (incl. theology) and beliefs. Denmark used to be an almost mono-religious society, hence, the word Church means the *Church of Denmark*. The *religion* of an individual is a qualitative variable of *belonging* (membership) that says if she 'buys' the package of a certain religion. *Religiosity* is a quantitative measure of the *intensity* of the religion. Thus, it is the average of the importance of religion in all aspects of life. At the aggregate level, religiosity is the average intensity.

Table 1. The seven variables discussed

Macro	Micro	Type of religiosity and alternative
C	C	Religiosity within the Church (of Denmark)
U	U	Outside religiosity, with two parts: $U = V + W$
V	v	Religiosity within other formal religions
W	w	Other beliefs: folk beliefs, superstitions, spirituality
R	R	Total religiosity: $R = C + U = C + V + W$
Z	Z	Secular alternatives
E	e	Everything for which religion can/has be used: $E = R + Z$

Section 3 summarizes the results of two prior papers: (i) One analyzes contemporary *cross-country data*. It demonstrates that poor countries are 2-3 times more religious than wealthy countries, and it shows that Denmark is no outlier in Western Europe. It also reports that different aspects of religiosity are strongly correlated in aggregate data, so that data for even *one* important aspect will work as a good proxy for the whole package. (ii) The second analyzes *one long-run time series* that is a good proxy for religiosity: It is the per capita church *density*, which we have compiled every 5th year for the last 715 years for Denmark. We find that it has fallen five times since 1750.

Section 4 discusses how the Transition has reduced Church membership. The fall happened rather late and is only about 22 percentage points, so it is small compared to the fall in church density. Section 5 looks at outside religions. Only the Church of Denmark was permitted (with small exceptions) until the Constitution of 1849 granted religious freedom. Other religions remained marginal until the 1970s, but since then many other religions have established a presence.

Other beliefs are mainly defined negatively as beliefs that are not part of any formal religion and not based upon science. It is the motley and changeable mixture of folk-religiosity, superstition and spirituality. In some cases, such as astrology, it is clear that it belongs into this category, but in other cases, notably within alternative medicine it is less clear. These beliefs are additional to other religions, and should decrease for the same reasons the official religiosity. This seems to be the case.

Section 6 turns to secular alternatives to religion: It is clear that the sheer amount of science and technology has increased dramatically, and so has the use of these alternatives. In addition, the large growth of the secular welfare state has dwarfed the institution of the Church, who has lost many of its functions. Thus, the Church is reduced from being a large player in society to become a rather small one.

2. The theories

Section 2.1 is a bookkeeping framework to keep track of the variables listed in Table 1 and in Figure 1. Section 2.2 outlines transition theory, while section 2.3 surveys secularization theory, which exists in a handful of versions, of which some are close to transition theory. Finally, section 2.4 summarizes the measurement problems.

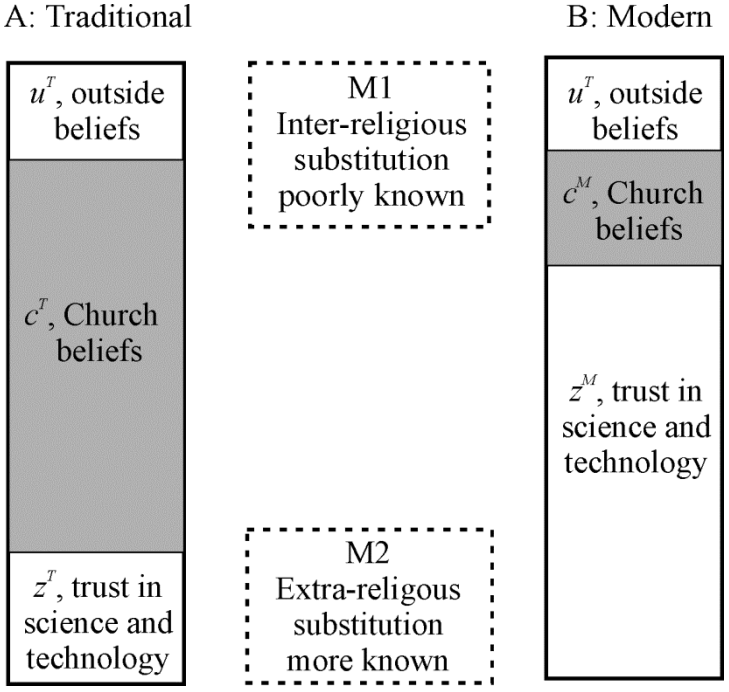
2.1 Bookkeeping relations between c, u, r and z defined in Table 1

To understand the transition, it is useful to start by the bookkeeping equations (1) and (2) illustrated on Figure 1 that is calculated for the average person. The two identities cover everything, *e*, for which the average person may use religion. The superscripts *T* and *M* are for traditional and modern society.

(1)	$e^T = [c^T + u^T] + z^T = r^T + z^T$	Traditional society,	where $u^T = v^T + w^T$
(2)	$e^M = [c^M + u^M] + z^M = r^M + z^M$	Modern society,	where $u^M = v^M + w^M$
(3)	$e^T \approx e^M$	Key behavior assumption	

Equations (1) and (2) are true by definition. They contain two margins of substitution: The inter-religious margin (between *c* and *u*), and the extra-religious margin (between *r* and *z*).

Figure 1. Illustrating the two systems of belief in the country



Equation (3) is a deceptively innocent looking behavioral relation, which says that the potential use for religion is constant. On Figure 1 it is drawn as an equal size of columns A and B. The reader may dispute (3) – then Figure 1 show relative shares.

Given that (3) is true (1) and (2) can be inserted in (3) to yield:[3]

(4) $-\Delta c \approx \Delta u + \Delta z$ or $-\Delta r \approx \Delta z$

Section 5 tries to assess the size of the inter-religious substitution. The crude numbers found suggest that, even when v has increased, $u^T > u^M$, so that $\Delta u < 0$. Section 6 turns to the margin of extra-religious substitution: As Δc is large and negative, it follows that Δz must be at least as large and positive. This tally with casual observation: Much of what people used to need religions for is now replaced by secular solutions that people have come to trust.

The Church has worked in fields, where it filled an institutional void. This notably applies to the ***Big Three***: healthcare, education and social protection that are services with considerable positive externalities, where an old tradition exists for collective action financed by gifts/taxes. In the past, the state/king financed the military, police and infrastructure and had big problems collecting enough taxes to do these jobs adequately, so it was happy to leave the Big Three to the Church, who, on its side, was happy to provide, as it greatly increased its role in society and the size of the Church employment. By running most of the Big Three, the Church could do it in its own spirit, stressing the importance of its message.[4]

However, after World War I the Social Democratic Party became important, and it wanted to greatly increase the production of the Big Three. The party came from an anticlerical socialist tradition. Even if this tradition mellowed already before the First World War, it still wanted the institutions of the welfare state to be non-confessional. The big growth of the welfare state only occurred after 1960. By now, the secular institutions of the welfare state totally dominate the remaining Church institutions within the Big Three; see section 6.

2.2 Transition theory: the intuition

The theory of economic growth and development knowns two basic steady states: (1) *Traditional* society has a low and stable technology that produces a low and (almost) stable income

3. When equations (1) and (2) are inserted in (3) it becomes $c^T + u^T + z^T \approx c^M + u^M + z^M$. By isolating the cs on the left hand side, it yields: $-(c^M - c^T) \approx (u^M - u^T) + (z^M - z^T)$, which is equation (4).

4. The reformation in 1536 reduced the size of the Church in the production of the Big Three (Paldam 2017), but there was still a role. During the Liberal Century between the Napoleonic War and World War I, the state was small. In addition, the Danish Government and Parliament was engaged in a power-struggle that froze public expenditures from about 1870 to 1901.

for a stable population. (2) *Modern* society has a high and dynamic level of technology, which produces a high and growing income and a stable population, as the technology is international, modern countries converge to the same income. The change from one steady state to another is termed a transition, and the transition between the two main steady states is therefore the *Grand Transition*.

Modern economic growth started about 250 years ago in a few European countries (including Denmark),[5] and it has gradually spread. Thus, both steady states have existed for several centuries, and a considerable gap has developed in incomes. The grand transition is thus getting larger. It changes society profoundly – all socioeconomic variables, we know of, have transitions.[6] One of the most well-known is the Demographic Transition causing a population increase of 5-7 times – in Denmark 6.2 times.

Transitions even occur in variables that are so far from the economy as religiosity. The level of religiosity, *r*, was high and stable in traditional society – incl. Denmark before 1750 as shown below. It is much lower in modern society (Paldam and Gundlach 2013). The process of reaching stability in modern society has a long braking period,[7] but it seems to be happening.

The study of transitions suffers from the problem of confluence. Since everything changes, it is easy to present evidence for stories that include different variables. Thus, one can claim that religiosity falls because education has increased, but it is also possible to argue that religiosity has fallen due the great increase in healthcare that has reduced the health risks for which people need divine protection. In addition, the growth of insurance and the welfare state has reduced the effects of bad outcomes produced by other risks. While it is easy to show many patterns in these mechanisms, it is difficult to sort out their relative importance.

This paper deals with long-run time-series. An alternative – much richer – source of data about religiosity is cross-country polls, see section 3.2. Cross-country results are *equivalent* to time-series results if low income countries, LICs, today are similar to how today's developed countries, DCs, were 2-300 hundred years ago, when they were LICs. A great deal speaks for equivalence, but it is easy to point to modern goods from DCs, such as mobile phones and trucks that are widespread in the LICs today.

5. Our story starts 250 years ago, when the transition started, unfortunately adequate annual data starts only from 1820, so the first 70 years of the story is covered by uncertain trends only.
6. In traditional society the share of agriculture, fertility, mortality and corruption, are high, the level of education and urbanization is low. In modern society the share of agriculture, fertility, mortality and corruption are low, while education and towns are large.
7. People tend to keep parts of their childhood beliefs, and to pass some of them on to their children.

2.3 Transition theory: the growth mechanics[8]

The theory of economic growth and development consider society as a macro production function, where wealth, Y (the GDP) is produced by some factors of production such as K, physical capital, H, human capital (i.e. education), labor L, and time, t, so that:

(5) $Y_t = A_t F(K_t, H_t, L_t)$ which covers the production of collective goods as well.[9]

The variable A_t is the stock of knowledge, that enters production though K and H. In traditional society $A_t \approx A$, is almost constant. In modern society A_t is (much) larger and keeps growing. A large (rather technical) literature develops the model and applies it to the data; see Jones and Vollrath (2013) for a lucid survey. It is rarely noted that (5) has a large implication for religiosity:

(6) $A_t = A_t^Z + \Omega$, knowledge is the sum of secular and religious knowledge

(7) $R_t^A = \Omega / A_t$, the importance of religion in knowledge

Religious knowledge Ω is almost stable. In traditional society secular knowledge was also rather stable, $A_t^Z \approx A^Z$, which causes A^T and hence (7) to be stable too.

In modern society secular knowledge, A_t^Z, is rapidly rising, which causes R_t^A to fall. Thus, (7) gives a steady fall in the importance of religion in one crucial aspect of life.[10] We conjecture that the increasing confidence people develops to the vast body of secular knowledge A_t^Z does influence its importance in other aspects of life too.

The mechanism modeled in (6) and (7) operates on most aspects of religiosity. This is particularly important as regards healthcare where scientific progress has been rapid, but also quite late (Porter 1997). There is still some alternative medicine, but before the transition, all cures were 'alternative' in the sense that they had a weak scientific base. Now many cures have a solid scientific base and they often work. Thus, both c and u, should fall.

The theory does not say that religion disappears, but the use people make of the religion becomes more limited: Instead of praying for rain, it is now possible to drill for water and irrigate, and it works better. Thus, farmers will come to use less religion and more technology.

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8. This section is a brief introduction to the formal model presented in Gundlach and Paldam (2012).
9. It covers the production of the big three – for social protection, it covers the production, but not the transfers.
10. Universal primary enrolment was introduced in 1814. Here kids went to school every second day for 7 years. Confessional bible knowledge was a substantial part of the curriculum. Now children go to school 10 year and there 1 period of religion per week for 2(?) years – and it is not confessional.

2.4 Secularization theory: A short survey of a large discussion (to be revised)

A core research field within the scientific study of religion concerns the secularizing effect of modernity. It deals with both religion and religiosity.

Secularization theory goes back to classic sociological thinkers who conceptualized different processes through which rational thinking would replace religion in post enlightenment societies (Marx 1843, Durkheim 1893, Weber 1903/04). It became clear during the 20th century that religion did not disappear, which sparked considerable debate about secularization theory among sociologists of religion.[11]

Roughly speaking, European scholars have argued for secularization, while American sociologists have argued against it (Casanova, 2006). In recent years, however, American analyses focus still more on the rising number of religiously non-affiliated, the 'nones', see e.g., Zuckerman (2008), Putnam and Campbell (2010), PEW (2015).

Over the course of this debate, the term secularization has acquired countless connotations and definitions (Shiner, 1967; Dobbelaere, 2002). This paper looks at an important indicator for the intensity of the dominating religion in Denmark. Thus, it provides an insight into macro aspects of the fall of institutionalized religion. Our findings seems to generalize to most European countries, but as the cross-country study of the Religious Transition illustrates, there is considerable variation around the transition path (Paldam and Gundlach, 2013), and the USA is a notable outlier.

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11. Some proponents of secularization are Wilson (1966), Berger (1967), Voyé (1999), Norris and Inglehart (2011) and Ahlin (2015), while some opponents are Stark and Iannacone (1994), Berger (1996), Stark (1999).

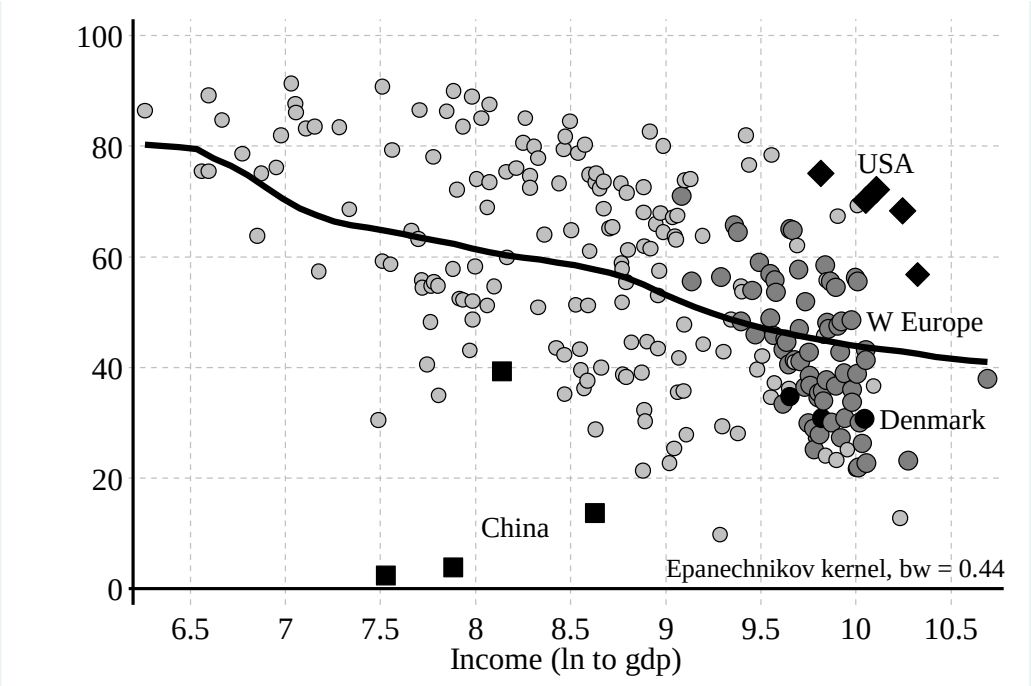
3. Two measures of religiosity: cross-country, *R*, and times-series, *s*

This section summarizes two recent papers of the authors analyzing religiosity in the perspectives of cross-country and long time-series data. We do not claim that our papers are greenfield projects, but we skip most of the references given in the previous papers. Section 3.1 reports the main cross-country findings, while section 3.2 reports the main time-series findings. They are reached by using the crude proxy of per capita church density, which is a key data in the rest of the paper. Section 3.3 to 3.4 discusses problems with the proxy.

3.1 The cross-country measure for R, total religiosity

Paldam and Gundlach (2013) study the evidence about religiosity in the five first waves of the World Values Survey (cf.) that covers 95 countries. To catch different aspects of religiosity (irrespective of religion) in these countries 14 items were selected. The individual answers scatter a great deal, but when each poll is averaged, a clear and robust pattern with 240 observations emerges. Factor analysis over the 14 items yields the *R*-score for religiosity in percentage points, which is shown on Figure 2.

Figure 2. The cross-country pattern in religiosity



Note: The figure is from Paldam and Gundlach (2013). The *R*-measure is explained in the text. The bold black line is a kernel regression line explaining *R* by income. The observations for Denmark are from 1982 (left), 1990 and 2000 (right). Income is the natural logarithm to the *gdp*, which is GDP per capita.

The analysis gives three important results (R1) to (R3) for the present study:

(R1) The *R*-score tells a highly significant story of a transition from a score of about 80 in poor countries to a score of about 40 in wealthy countries. The fall seems to continue even when it may be tapering off. Perhaps it will stabilize at about 30.

(R2) The 14 items shows that the measures of religiosity for the different aspects have a roughly fixed relation to *R*. If the average respondent says 'God is very important in his life'; he also says that 'his religion has answers to moral questions'; and he goes to church frequently, etc. The last item turns out to be a typical one with factor loadings of 0.8 to 0.9 to the other items. The data covers countries with different religions, where the weight placed on the 14 aspects are likely to be different. Consequently, the factor loadings must be even higher within each religion. The item with the lowest loading to the *R*-factor is Church membership. While the other 13 items load in the range from 0.95 to 0.75, the membership item has a factor loading of 0.53 only.

(R3) Some authors, notably from the USA, see Denmark as exceptionally irreligious (Zuckerman 2008, 2009). Figure 3 shows that Danes do have low religiosity, but in a West European context (the dark gray circles), it is not exceptionally low, e.g., France has much the same *R*-scores as Denmark. The figure also shows that the USA is an outlier, though the latest observation (with the highest income) shows that the USA is becoming less extreme.

3.2 A long time-series proxy for inside religiosity: The church density

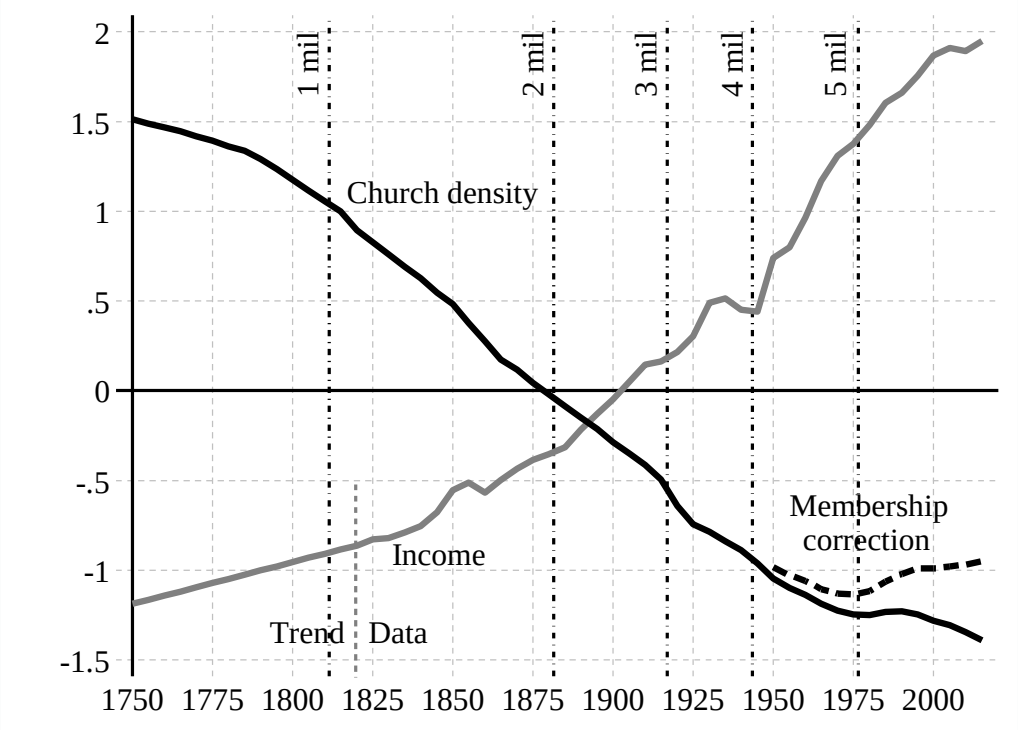
Paldam and Paldam (2017) reports data for a religiosity proxy for the present area of Denmark every 5th year since year 1300. The proxy is the per capita density of the churches of the Church of Denmark. The density falls throughout, but at two different, rates.

For the period of the traditional society before 1750, the fall is about 0.1% pa. This is consistent with the upward trend in the efficiency of church use due to better infrastructure. We concluded that religiosity was high and constant in the traditional period.

From 1750 the transition starts. Since then the church density has fallen no less than five times, which is by 0.7% per year. Figure 3 show the path of the church density and income (which is the natural logarithm to the GDP per capita) in this period. The two curves are almost mirror images of each other. The change was smaller in the beginning, and both changes taper off at the end, so it looks as a transition curve should.

The size of the fall is so large that it makes it strongly suggests that religiosity in Denmark before 1750 was as large as it is in poor countries (as Tanzania and Pakistan) today.

Figure 3. Church density, *s*, and income, *y*, 1750-2015



Note: The time unit is 5 years, so $N = 55$. The two variables are normalized to zero mean and std one to fit in the same diagram. The correlation between the two series is $r = -0.95$. The membership correction is discussed in section 4.1. The '# mil' lines indicate the year where the population exceeded # millions.

The scale on Figure 2 and Figure 3 is different, and the fall on Figure 3 is larger. The main reason probably is the conceptual difference between the data. However, it might also matter that Figure 3 looks at data for *C* only, while the data for Figure 2 tries to measure total religiosity.

3.3 Measurement problems for the proxy

Our study, just cited, also develops the proxy relation between the church density and religiosity for a period with the same religion:

(8) $c_t = \mu\,(\kappa_t - \beta_t)\,s_t$, where μ is a scale factor, κ_t is capacity utilization for the churches, and β_t is a composite trend, see Table 2a.

Table 2a shows the main problems in the proxy relation (8), and points the section, where they are discussed. The table deals with official religiosity: Some rows are covered by soft assessments, and for row 3c no measurement exists.

Table 2a. The transition: The analysis of inside religiosity, *c*

		Scaled so that + means that the fall in row (1) increases:	Size/sign	Section
1		Long-run fall in religiosity as measured by church density, *s*	5 times	3
2		The cyclical capacity utilization, κ	2.5 times	3.3
3		Three components of the composite trends, β [a)]	Small	
	a	Increase in the efficiency of church use due to better infrastructure	+	3.4
	b	Changes in the location of the population, notably urbanization	−	3.4
	c	Relations between parts of package shift/mellowing of the religion	+?	5.4

Note: The row shaded in gray, is based on very weak data. The numbering continues in Table 2b.
a. An estimate of 0.1% p.a. is given in Paldam and Paldam (2017).

Table 2b looks at the corrections necessary to reach total religiosity $r = c + u$. Rows 4 (a, b and c) deals with the religiosity of non-members, who may have a different religiosity than the Church members. Rows 5 (a and b) deals with Church members – in fact members of any Church – who change beliefs while remaining member.

Table 2b. Corrections to reach total religiosity $r = c + u$

		Scaled so that + means that the fall from row (1) increases:	Sign/size	Section
4		Religiosity of non-members		5
	A	(M1) Ex-members joins other religions – mostly more religious	−	5.2
	B	(M1) Immigration of non-Lutherans – mostly with higher religiosity	−	5.2
	C	(M2) Ex-members become atheists	+	5.1
5		Church members change religiosity while remaining members		5.3
	A	(M1) Church members adopt other beliefs of religious nature	−	
	B	(M2) Church members cease to believe in parts on the religion	+	

Note: (M1) is inter-religious substitution; (M2) is extra-religious substitution.

While section 3 uses solid data and uncontroversial economic theory, sections 4-5 uses scattered observations – even guesstimates – and the contested secularization theories from the sociology of religion. That is, it tries to charter poorly known and disputed land.

3.4 Today: The overcapacity problem and the kink in 2000

At present church services (in Denmark) are poorly attended. It even happens that nobody attends, so that the service has to be canceled [messefald]. Statistics for these matters are not collected, though occasional polls are made.[12]

12. It would be easy to collect such data. It is an interesting question why this is not done. The Niskanen model of bureaucracy suggests that it is a device to protect the bureaucracy, in causa the Church (Niskanen 1994)..

Table 3. Assessing the use of the church capacity in 1750 and 2015

		(1) 1750	(2) 2015
(1)	Population (in 1,000)	863	5,659
(2)	Members of the church (in 1,000)	860	4,401
(3)	Number of churches	1,914	2,423
(4)	Seats app 150 per church (in 1,000)	290	365
(5)	Attendance the average Sunday	25%	2½%
(6)	Average number of people present	215	110
(7)	Capacity utilization: (6) in % of (4)	75%	30%

Note: The gray cell is the most uncertain estimate. The 2½% attendance includes the Xmas service and other services where attendance is high for special reasons.

Column (1) is based on anecdotal evidence suggesting that the churches were rather full at the typical Sunday service in 1750.[13] Column (2) use the most commonly cited number is that the average service is attended by 2-3% of the congregation, (European Social Survey, Iversen 2014). The capacity utilization is about 30%. This is also likely from our assessment of religiosity in 1750 above.

Table 3 interprets this as saying that app 25% of the population, went to church the average Sunday, which was almost full capacity (75%). Thus, the capacity utilization has fallen by 75/30 = 2.5 times. This is the first indicator of measurement error – row 2 of Table 2a – showing that the densities substantially underestimate the fall in religiosity.

In 2013 the Diocese of Copenhagen recommended that 17 fairly large and relatively new churches should be closed, but only eight of those were eventually closed. It still gave a clear downward kink in the number of churches. It has recently been suggested from the Ministry that 204 (8%) more churches should be closed during the next couple of decades, as they are only used sporadically.[14] The Ministry of the Church [Kirkeministeriet] has appointed a committee to study alternative uses for the church buildings. Even if half of these churches escape closure, it appears that the kink in 2015 will be the start of a new trend.

3.5 Churches as a local good and the question of transport infrastructure

The analysis in this paper is aggregate, and thus it only mentions the local aspects of churches in this section – the rest of the paper disregards geography. A church is a local (public) good

13. By law people should go to church in 1750, but the law was not enforced, and it did not cover children and sick people, which were about 40% of the population (Larsen (2012).

14. Sources for the recent discussion about church closings: The home page of the Ministry of the Church has posted the official documents and policy statements. The newspaper Christian Daily [Kristeligt Dagblad] has made a home page covering the public discussion. The closing of village churches has two problems: Most of these churches are old and protected national treasure. The venerable buildings have an emotional value in the minds of many people.

for two reasons: It is expensive to move, and it is institutionally tied to a congregation that lives in a parish.

Denmark is a small, flat country, but in 1750 roads were poor. Today good roads are everywhere. So are cars. Thus, distances have decreased tremendously when measured in time and effort. Churches are now able to service much larger areas than before, though they are not supposed to do so.

One part of the Grand Transition is the Urban Transition, but while many have moved into the towns, the population has increased even more than the town population. With the increased transport infrastructure, people may work in towns and continue to live in the countryside. Consequently, parishes close to towns have grown very much, and few parishes have actually lost population.

When suburbia sprawled from the towns, it swallowed many villages. Due to the Religious Transition, the churches of these villages were often enough. Only 117 suburban churches were built between 1960 and 2000, thus the church density has a regional component: Some of the smaller rural municipalities have between 10 and 20 times the density of the new suburbs in Greater Copenhagen (as Hvidovre and Glostrup).[15] Due to this disequilibrium, the 204 churches threatened by closure are village churches.

15. A background paper is available on the cross-municipal pattern in the church density (Paldam 2013).

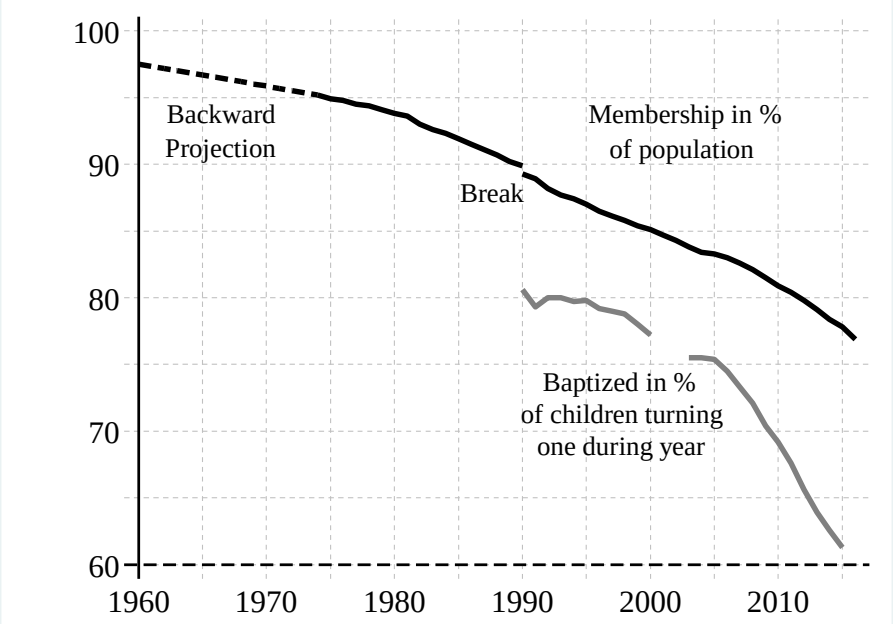
4. Church membership: From stability to a steady fall

Section 4.1 reports the data for Church membership. Item (R2) is section 3.1 means that consumption of the 'religion package' is scaled down proportionally when religiosity falls. However, section 3.2 mentioned that the item 'belonging to a Church' is an exception. Even when all other religiosity items seem to fall proportionally, most Danes still want to belong to the Church. Section 4.2 discusses the belonging-without-believing complex. Section 4.3 looks at the role of the Church in social capital.

4.1 Church membership: Data since 1974

When a child is baptized in the Lutheran church, it becomes a member. Any time later people may leave or enter as a member. Church members pay a (small) tax, which is collected with other income taxes. The Church membership has been registered from 1974, where it was 95.2% of the population. It is also known that in 1900 about 98.5% of the population was members.[16] Figure 4 shows the development. It includes 15 years of backward projection done under the assumption that the level in 1960 was 97.5%.

Figure 4. Membership of the Church of Denmark, 1960-2016



Note: The break in 1990 is due to the change from tax based to register based statistics, cf. Church Statistics.

16. Early volumes of the Danish Yearbook of Statistics reported that the membership rate was 98.5% in 1890, and 98.7% in 1911, but then no more data are available until 1974.

As the membership must have been between 100 and 98% from 1750 to 1950 it was an almost constant number close to 100. Thus, Denmark used to be a mono-religious country, and the religion is still dominated by the Church of Denmark.

The figure also shows the ratio of children being baptized in the Church. The two ratios are differently defined (as indicated on the figure), but in equilibrium they should be roughly the same. When the ratios differ as much as they do today, it indicates disequilibrium. It is likely that the rate of baptisms leads the membership rate. This suggests that the fall in the membership rate will continue along the trend that has been stable for the last 35 years. In another 40-60 years, the membership ratio may have fallen below 50%.

The church density on Figure 2 was calculated relative to the whole population, but the dashed curve starting in 1950 shows what happens if the density is calculated relative to the church members only. It gives a density that even rises at the end. This seems to reflect how slow the adjustment is to the falling church attendance, and thus it points to the need for a downward adjustment in the church stock, as is in the making.

4.2 The belonging-without-believing complex

The high membership rates indicate that Danes want to belong, but they do not use the church very much. Thus, they belong without believing – a situation that is common throughout Western Europe (Zuckerman 2008).

The main idea in the belonging-without-believing theories is that many people mainly keep their membership in the Church as a symbolic link to the past and to the community where they live. Most Danish churches have the colors of the flag, with a whitewashed body and a red tile roof. They are often on a hilltop, so they are visible from afar. They are a widely recognized trademark of the Church, and a national symbol. Thus, it has to do with tribal/ethnic identity. A large majority of Danes – also nonbelievers – has invested emotional capital in ‘our’ old churches. It is much as they have in the (slightly older) royal house.

Part of this complex is that many people still use the Church to provide ceremonies in connection with the transitions in life. Churches are popular for weddings, and the Church does solemn burials, even in cases where the parish priest has not met the deceased. The Church has much expertize and great buildings to provide ceremonies on these occasions.

To the extent that the church is reduced to a provider of ceremonies when needed, it does keep the most church-intensive part of the packet. This is the second indicator of measurement error. It (also) says that the densities underestimate the fall in religiosity, but it is difficult to estimate the size of this underestimation.

4.3 The role of the Church in social capital

Many studies have shown that social capital – both as regards the density of voluntary organization and trust – are relatively high in Denmark. For a data based survey see Svendsen and Bjørnskov (2007). Putnam (1993) argued that social capital is a variable that is stable for centuries. If this is right, the Danish level of social capital was already high before the Grand Transition.

The only measure of social capital, where something is known so far back, is the density of voluntary organizations. Two hundred years ago, the church and the inn across the road were the key meeting places for the local population, though there were also guilds and trade organizations. Hence, the Church was a crucial element of social capital.

The membership measure of social capital still includes the church today, but if the membership is weighted with the frequency of contacts, it is not so important, and the Church has been supplemented with many other associations. The majority of these associations are less than 150 years old, and they were not founded to replace earlier organizations. Most sports clubs are formed around sports that were introduced in the country about 100 years ago. Trade unions started about 140 years ago, and so did half of the present political parties. Many NGOs are created around the big public spending programs that developed even later.

Thus, it is clear that the role of the Church in the large social capital of Denmark has greatly decreased during the last couple of hundred years, but it is not clear if it has decreased more or less than has the church density proxy.

5. Inter-religious substitution between *C* and *U = V + W*

Section 5.1 looks at other religions, *V*, and 'nones', while section 5.2 discusses other beliefs, *W*. Section 5.3 reports some orders of magnitude found by looking at employment in the sector supplying such beliefs. Finally, section 5.4 considers the movement towards a less supernatural theology within the Church.

5.1 The increase in other religions, V

About 1900 app. 1.5% of the population were not members of the Church. App. 0.7% were other Christians, 0.1% were Jews, and the remaining 0.7% were atheists. These groups (notably the atheists) became even smaller as the analysis moves back in time, but they are small, anyhow.

Today 1.2 million people are outside the Church. The left hand panel of Table 4 gives an estimate of the distribution of these people. The ministry of the Church has a registration of religions (or religious groups) that gives the group the right to make legal marriages, register kids' names with the CPR-register etc. The registered Churches/Religions report that they have 165,000 members only. This is app. 25% of the people with other religions.[17]

Table 4. Religions in Denmark 2015 and the change since 1750

Levels 2015 in million people			Change since 1750 in percent of population		
	Numbers	Gone to	Relative to the Church	Down	Up
Population	5.6		Immigration of non-Lutherans	10	
Church members	4.4		Resigning membership	14	
No religion		0.5	No new religion		12
Others		0.7	Other religions		12
Catholics		0.1	Catholics		1
Other Christian		0.1	Other Christian		2
Muslim		0.4	Muslim		7
Other non-Christian		0.1	Other non-Christian		2

Note: The membership has fallen by 1.2 million or from from 98% to 76%. That is a fall 24 pp.

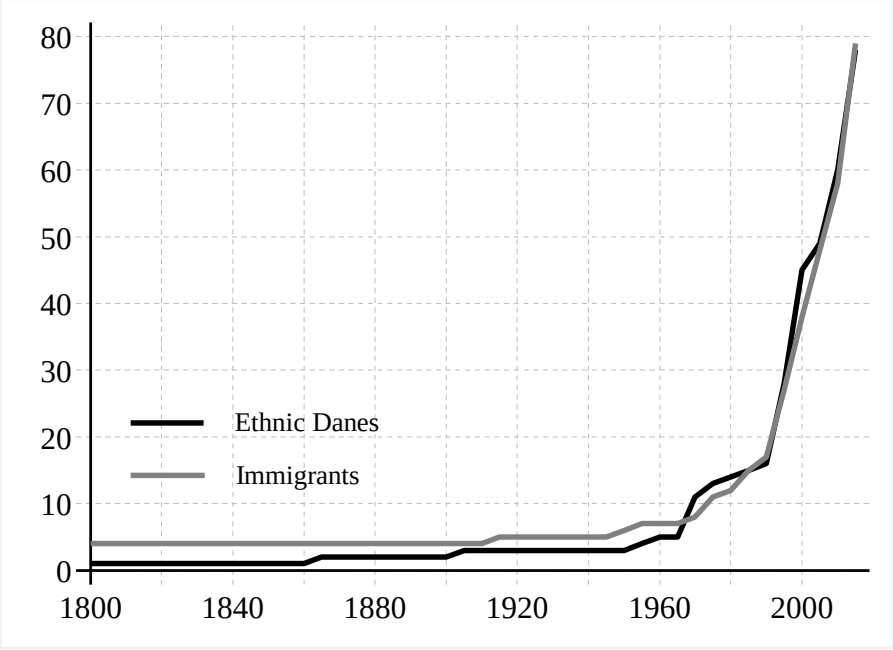
Since the 1960s the Danish population has been augmented with about 12% immigrants. Almost 5 pps are from other Western countries notably the EU. Some, such as Swedes, Norwegians and Northern Germans, are Lutherans, and nearly all of the remaining Western

17. The Muslim groups are a big problem for the registration. Islam has no central organization, but it is organized around 200 mosques for ethnic groups with a handful of different languages.

citizens are Christians as well. Their religiosity is typically much the same as the one of the Danes, so they are not visible in the 'religious landscape'. If you want to belong-without-believing, it does not matter which Church you do not believe in, as long as it allows you to belong, and, of course, the dominating Church provides most belonging.

The remaining 8% are from less developed countries (LDCs). They come from countries that are earlier in the Grand Transition, so they have a (much) higher religiosity than ethnic Danes. This is an important factor in the cultural divide between these immigrants and ethnic Danes. The immigrants have started the process of cultural integration and intermarriage, but it is going rather slowly. The current immigration is about 10'000 per year, so there is a constant inflow of people who keep the belief of their old country alive.

Figure 5. Registered religions



Note: As the two curves overlap it should be noted that they end (in 2015) with 78 and 79 for the ethnic Danes and the immigrant Churches (etc.) respectively. Before 1865 only the Lutheran Church was registered as a Danish Church, while 4 Churches for immigrant groups were permitted. Since 1960 the numbers have exploded. The 156 Churches in 2015 reported a total of about 164,245 members, but the true number is probably 700,000. This also means that 500'000 are non-members of any religion.

Figure 5 show the increase in registered religious communities. It is remarkable how late the increase came. Most of the new formal religions have home pages and give information about their clergy. There appears to be app 250 Muslim imams and 75 Catholic priests, etc. Altogether, about 500 people are employed by other religions. Many of these are not full time

employees, but often they do not have another job. Thus, we use 500 as the employment in other religions today in Table 5 below.[18] In 1750 it must have been below 10. These numbers are included in the table.

5.2 Other beliefs of a religious nature, W

We now turn to religious beliefs that do not constitute a 'full' religion, but are held by people who typically also have a religion. They are of a religious nature in the sense that they are not accepted by science, but also, they are not part of any religion.

These beliefs are a mixed bag: Some are old folk beliefs/superstitions; others are cosmological ideas, known as spirituality; still others are old scientific ideas often from non-Western societies, which have been rejected by mainstream science, such as astrology.

In many cases people remain Church members, but make their own eclectic package by adding new elements and deleting others of the official ones of the Church. Polls have revealed that some members of the Church believe in reincarnation, astrology, etc., while many reject hell and angels, and few relate to the Holy Spirit. In short, they tailor their own syncretistic religion.[19]

Many of these beliefs are within alternative medicine. Some of these are borderline accepted within mainstream medicine, such as acupuncture. Especially in mental healing a whole spectrum exists from exotic shamanistic rituals to mundane meditation techniques. Sometimes the 'religious' elements in healing/medicine are just devices to increase placebo effects of otherwise dubious cures. Thus, two lines have to be drawn in the sand to delimit this sector:

(L1) What beliefs are of a religious nature?

(L2) The services provided by this sector are often mixed religious and wellness oriented. A line should be drawn between the two.

Typically, neither the provider nor the recipient takes these 'beliefs' to be religious. That is precisely why they can be combined with any religion, and why the lines are difficult to draw. The next section looks at employment in the sector providing religious services.

18. In the official church there are 4,400,000/1,800 = 2,400 members per priest. In the other religions it is 700,000/500 = 1,200 or half as many. This corresponds to a higher religiosity within non-official religion.
19. On individualization of beliefs; see Luckman (1967), Dobbleare (1987) and Putnam and Campbell (2010).

5.3 Some employment numbers: Inside and outside religion

One way to assess the size of *W* is to look at employment. It is certainly not a perfect method, but some numbers do exist, and if they are supplemented by more or less precise guesses, the picture reported in Table 5 emerges. The table assesses the official clergy as 3 times the number of churches. This is probably a low number especially in 1750.

Table 5. Religious employment numbers – mixed estimates and guesstimates

		(1)	(2)	(3)	(4)
	Year	1750	2015	Standardized	Difference
(1)	Population in thousands	860	5,640	(1) *x* 6.5	Col (2) – (3)
(2)	Church staff [a)]	8,000	8,500	52,000	−43,500
(3)	Staff of other religions	-	500	-	+500
(4)	Unofficial beliefs	500	2,000	3,200	−1,200
(5)	Sum (2), (3) and (4)	8,500	10,500	55,200	−45,200

Note: Column (3) assumes the pattern of column (1) for a population that is 6.5 larger, which is the ratio between the populations in the two years. Numbers are in full time equivalents. The sum is rounded to nearest one hundred. The gray cells indicate the uncertain estimates. The number in row (2) is twice the number of churches. (a) the number of priests are about 2050.

It is not known how many people worked in the folk religion/healing sector in 1750. The people in these trades had to hide as they were, in principle, doing something illegal. However, anecdotal evidence suggests that many villages had somebody, or knew somebody in a neighboring village, who 'knew more than the Lord's prayer', as the saying went. Porsmose (2008) assesses that there were about 5,000 villages before the transition. Thus, it is easy to reach a thousand people working in the gray religion. Most worked only part time. Converted to full time-equivalent gray-religiosity workers were probably between 300 and 700. In Table 5 it is set at 500. It is a much lower number than the one for employees of the Church.

A few attempts have been made to assess the size of the non-Church religion sector today.[20] This sector is legal today and it has an interest in advertising its existence, so, in principle, it should be easy to find people working for religious organizations or as self-employed service providers.

However, the two division lines (L1) and (L2) from section 5.2 are big problems. Astrologists and palm-readers are clearly in the sector, but acupuncturists are probably not. The most uncertain part of this estimate is the unregulated sector of psychotherapists that

20. The most comprehensive attempt is done by the Center for Contemporary Religions at Aarhus University. The leader of the center Marie Vejrup Nielsen has been very helpful.

include the whole range from serious paramedical personnel to alternative healers of the soul. Our attempt to find the employment in the field came up with a numbers between 1,000 and 3,000. The latter estimate seems to contain many that work only part time. Table 5 uses 2,000 as a moderate guesstimate. It is considerable lower than the employees of the Church.

If we consider that most of the 2,000 people working in the other beliefs sector are in alternative health, they should be compared with the 212,000 in the official health sector (Nomesco 2015), thus we are dealing with an alternative activity amounting to about 1% of the secular activity in the field, and about 25% of the official religiosity.

Table 5 puts together these numbers. Columns (1) and (2) show the number of people working in 'religion'. It does grow due to the growth of the unofficial religiosity sector. Once the increase in the population is taken into consideration a different picture emerges. It shows a large fall in the Church employment per member, leaving a gap of more than 40,000 clergy-jobs that had to be filled if the employment in the religion sector had to be of a constant size relative to the population. These calculations are surely crude, but the gap left by the contraction of official religiosity is large, and the reader will note that even if the number of workers in other beliefs has increased 4 times in 2015 compared to 1750, it does not really change the conclusion – there has been a large fall in religiosity. The size of the fall in the unofficial sector is smaller than the fall in the official sector, so it is another indication of measurement error. And this time it points to an overestimation of the fall.

Thus, the employment numbers do not support the idea that other beliefs have grown to fill the empty space left open by the contraction in the official religion. However, if we look at the increase in the number of non-religious workers in the trades that were previously within the church, such as physicians, psychologists, nurses, teachers, etc., it is easy to fill the gap as will be argued in section 6.

With the large growth of the official health one should imagine that the scope for alternative healthcare would fall. That is, if alternative medicine aims at curing diseases that the official health system cannot cure, it follows that as the official sector gets more efficient then the alternative sector falls. This is the *substitution* view. However, there is also the *compliment* view. It suggests that some patients, who are treated by the official system find the treatment too mechanical, and may want something 'extra' of a spiritual nature, so that they buy into alternative cures as a complement.

We think that the substation view is the most important, but if the complement view has some traction too it may explain why the fall in the size of unofficial religiosity is not as large as the fall in official religiosity.

5.4 Theology: From the supernatural to the philosophical

Within the two Danish schools of Divinity some effort has been put into reformulation of the message of the Bible and Martin Luther to be more in accordance with present society. Or, as it is often expressed: To make the message more relevant to people living in the 21st century.

A key part of such reformulations has been to gradually reduce the amount of the supernatural in the required beliefs, and to show that the religion is in accordance with science such as Darwinism, etc. The reformulation of Lutheran theology as a philosophy rather than as a set of supernatural beliefs, have been taken rather far by some clergymen.[21]

Several changes are ad hoc solutions of a practical character. In 1948 it looked as if there would be too few priests, it was discovered that female priests are better than none, and today the majority of priests are female. When the state granted civil marriage to gay couples, the Church allowed its priests to marry gay couples as well. In such cases it is up to the elected board of the congregation [menighedsrådet] and the priest to take the actual decision.

To the extent that the Church becomes softer and more philosophical, it is arguable that our proxy underestimates the fall in religiosity. This is the forth indicator of measurement error. It says that the densities underestimate the fall in religiosity.

This completes the list of measurement problems from Table 2. It is clear that most measurement problems err to the side of plus, so that the fall of five times is too small.

21. One even wrote a book to explain why he did not believe in God (Grosbøll 2003). After a meeting with his bishop, he decided to retire, but he was close to retirement age anyhow. In addition, a priest who declared that she believed in reincarnation (as opposed to angels) repented after a serious conversation with her bishop.

6. Extra-religious substitution between *R* and *Z*

Section 6.1 discusses the substitution of religious beliefs with trust in science is discussed, while section 6.2 turns to the secularization of institutions producing the Big Three: Health-care, education and social protection

6.1 The increased trust in science and technology

Religion is partly used as a factor of production and partly consumed for its own sake. The factor of production role includes its help in curing diseases, [22] protecting crops from drought and pests, and sailors going out at sea, etc. It is all roles where science and technology have developed successful alternatives.

As modeled in section 2.3, religions provide a constant amount of help, while science and technology produce a rapidly increasing help. Religion does help alleviating certain diseases, notably psychosomatic ones (Paldam and Schjødt 2015).[23] However, modern medicine is increasingly effective against a large number of diseases even psychosomatic ones. And the official health sector has grown dramatically since the transition from about 10,000 health-workers in 1750 to about 300,000 today, which is 5 times more than the growth of the population.

People still die of something, but now it is much later, and many of the most prominent causes of death in 1750 are now exterminated, notably tuberculosis, but also cholera, birth infections, etc. One of the main reasons for the growth of the secular health sector is its effectiveness. A simple indicator is the expected life at birth. It used to be around 40 years before the Grand Transition. At the age of 30 few people had their own teeth. Now the expected living age at birth has exceeded 80 years, and people keep most of their teeth until the end – though most are carefully repaired. Everybody knows that the great improvements in the length of life and health are due to better healthcare including the progress of dentistry, better food throughout the year, etc. Thus, they have to 'thank' science and technology for these improvements.[24]

22. Many Catholic Churches have chapels to saints who are known to cure diseases. In poor countries, these chapels often display silver models of various parts of the body given to thank the saint for curing the said body-part. As countries get wealthier such displays become rarer.
23. It is well known that placebo effects are quite large in medicine. The argument below is that the potential for such effects is constant, while modern medicine is increasingly effective.
24. It is a sign of this development that the old tradition of a blessing before a meal has vanished in Denmark. It seems to have been common as recently as 100 years ago.

6.2 The secularization and large growth of institutions

The big three collective goods are *education, healthcare and social security*. Up to the 16th century these goods were produced in small quantities by the Church. Paldam (2017) has assess the income/expenditure balance of the Church before the transition, and showed that the reformation meant a large loss of income for the Church. As a result the production of these services by the Church was squeezed, and to some extent taken over by the King's administration and later by the landowners, so they were partly secularized. However, for long the only staff available to produce these goods was church staff, but gradually the state came to educate teachers and healthcare personnel at secular universities and colleges.

As long as the Church provided the big three, people met Church staff at important times in their life, and they became dependent upon the Church when in need. When the church taught reading, writing and arithmetic, it was taught in the spirit of the Church, etc.

The century between the Napoleonic wars and First World War is known as the Liberal Century, where the public sector was small. In the 1930s and notably after 1960 a large welfare state developed. Though a few schools still belong to religious minorities (Catholics, Jews and Muslims), the school landscape is completely dominated by publicly funded schools today, where the teachers are no more religious than other people. The same story applies to health and social security.

Table 6 gives some crude numbers. The size of the religion sector from Table 4 is falling relative by 5 times from about 2% of the labor force to about 0.4%, while the secular employment in healthcare, education, and social protection has increased from 5% to 25%, i.e., by 5 times. It is now about 50 times larger than the religion sector.

These numbers are not precise. The secular employment is the public sector exclusive infrastructure, military, legal system, libraries, etc. but inclusive of private production of the three collective goods. This is the extra-religious substitution as regards institutions.

Table 6. Religious and secular employment compared

	1750	2015
Population	860,000	5,640,000
Labor force	430,000	2,820,000
Religion sector (Table 5)	8,500	10,500
Secular employment in the big three	21,000	700,000
	In % of labor force	
Religion sector share of labor force	2.0%	0.4%
Secular employment in the big three	5.0%	25.0%

Modern economic growth demanded an increase in the provision of the three goods, notably a dramatic increase in education. It soon became obvious that the Church could not provide. Also, when the progress in medicine made cures against one after another of the big diseases possible a demand for the mass provision of such cures arose, and again the Church was unable to provide.

In Denmark the solution was that the public sector became the provider. As the economy prospered the state managed to collect more in taxes.[25] Consequently, large public education, health and social security programs developed outside the Church, and gradually the Church was squeezed out. This obviously meant that the people's involvement with the Church became much smaller.

25. In the beginning, the state could not provide as it could not collect enough taxes, but the transition increased the ability to tax. Why this happened is a long story, but it is well documented (Philip 1965), Jepsen 1996), Mogensen 2003). It is a part of the Grand Transition that income turns taxable.

7. Summing up

Three facts seem to apply throughout Europe. (1) The population has increased 4-6 times since year 1750. (2) Most churches are from before that. (3) European churches are seriously underused. These facts are consistent with a large fall in religiosity.

This story is illustrated by a new data set for the church stock for Denmark. The church stock per capita is our proxy for religiosity. It is a poor proxy on the individual level and in the short run, but it seems to work fairly well on the national level and in the long run. In the 4½ centuries from 1300 to 1750, religiosity was high and roughly constant.

When the Grand Transition started around 1750, the density began to fall. Today it has fallen no less than 5 times since 1750. Our claim is that it indicates a similar fall in religiosity. This is confirmed by other calculations of the size of the Church in the economy. Most institutions that used to be associated to the Church – such as schools and hospitals – have been secularized. Thus, the size of the staff of the Church – and all other workers within religion in the country – has fallen much relative to the population, and so has the share of the Church in the GNP, while the Church sector used to be substantial it is now below 1%.

The link from the density proxy to religiosity is not precise, and the paper has discussed a number of problems with the measure. Some of the problems – notably the large fall in the utilization of churches – suggest that the measure underestimates the fall, while other problems – such of the growth of new religions – suggest that the measure overestimates the fall. We assess that the former qualification is larger than the latter.

The most uncertain part of the assessment is the role of unofficial religious beliefs that is held at the same time as the official one. Such unofficial religiosity has always existed, but it changes much more than official religion. It used to be forbidden and thus hidden. Today it is permitted, but not covered by systematic statistics. The scattered evidence found suggests that (i) it is much smaller than official religion, and (ii) that it has decreased as well, but (iii) not so much as official religiosity.

The large fall in religiosity is the Religious Transition, which is the adjustment of the level of religiosity to the huge changes that have occurred in the society. It is much the same as in the Agricultural Transition. There is still agriculture, but its share in total production has fallen dramatically in the last 250 years. By far the largest part of the fall religiosity is that religious beliefs have been replaced by trust in science and technology. Thus, the role of all religion in all aspects of life has fallen substantially the last 2½ centuries.

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26. Maddison (1926-2010) updated his data until 2010 one month before he passed away. His project is continued by a group of economic historians.

27. At one period, the Ministry of Culture contains the Ministry of the Church. The name of the Ministry of the Church is also translated as Ministry of Ecclesiastical Affair, to stress that it deals with all religions.

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