Church Attendance in the USA
Trend Estimation and Explanatory Determinants
1974 – 2004

Rational Choice Sociology, Venice 2006
Bettina Siflinger

Contents
1. Motivation
2. Theoretical Approaches
3. Methodological Design
4. Results
5. Summary and Discussion
1. Motivation

- In a lot of western countries the development of church attendance is declining

- An exception seems to be the USA: mainly since George W. Bush is President of the United States the religious tendencies seem to become more radically

- The main questions:
  1. Which development shows religious activity in the USA, and can the statement of a „fundamental christianity“ be justified?
  2. Which determinants can explain religious activity in the long run?

2. Theoretical Approaches

Theories of religion break down into demand-side and supply-side models

▷ The pioneering model for the demand of religion: a Becker-style-household model of allocation of time and religious activity (Azzi, Ehrenberg; Sullivan,Sawkins et al.)

▷ The religion market model focuses the supply-side factors (Finke, Stark)
2. Theoretical Approaches

1. A Becker-style-model of allocation of time and church attendance (Azzi, Ehrenberg 1975)

   - The approach is based upon three main reasons (motives) why people participate in religious activities: Salvation motive, consumption motive, social pressure motive
     → the most important is the salvation motive: people are assumed to maximize an utility function which depends upon secular consumption in each life period and afterlife consumption
   - Individuals allocate their time and goods among religious and secular commodities so as to maximize lifetime utility
     → quasi concave utility function
     → purchased goods and time are transformed in commodities
   - In maximizing utility, people are constrained by a „full wealth“ restriction
     → budget restriction: price for market goods, market wage, exogenous income and market interest rate
     → time restriction
   - Substitutional relation between secular and religious activities

2. Theoretical Approaches

Allocation-of-time model: Hypotheses

   - The higher the individual wage rate the lower the religious activity
     → a higher wage implies higher opportunity costs
   - Women show higher religious activity than men
     → gender gap
     → lower wage rate and lower opportunity costs for women
   - Difference in religious activity subject to the marital status
     → denominational strictness implies being married as most accepted form of family status
   - The higher the number of children the lower the religious activity
     → increasing marginal costs for time spent in religious activities
   - Belief in life after death conducts to a higher religious activity
     → salvation motive: realization of returns in life after death
   - If the individual belongs to an ethnic minority its religious activity is higher
     → lower opportunity cost because of discrimination and limited market chances
2. Theoretical Approaches

2. Religious human capital (Iannaccone 1990)

- Religious human capital is a person’s capacity to produce or appreciate religious commodities
- It depends upon religious knowledge, church rituals and doctrine
- Implication: The extension of the A-E allocation of time model through the religious human capital
- Investments in religious human capital are contrary to human capital investments in an individual’s lifetime

⇒ Religious capital as the dynamic component of allocation of time throughout a person’s lifecycle

2. Religious human capital: Hypotheses

- The higher the age of an individual the higher the religious activity
  ⇒ lower investments in human capital
  ⇒ higher investments in religious capital

- The higher the degree the lower the religious activity
  ⇒ investments in human capital for a long time
3. Methodological Design

- Data set: General Social Survey, cumulative version 1974 – 2004
  - Trend design in 31 waves
  - Time series and cross-sectional data available

- Description of religious activity as a time series

- Ordered logistic regression as a cumulative threshold model for analyzing the influence of various determinants on individual religious behaviour on 1975, 1984, 1994 and 2004

3. Methodological Design

- Dependent Variable: religious activity in 9 categories
  - For ordered logit model: no changes in religious activity necessary

- Independent Variables
  - Metrical variables: wage rate, age, number of children
  - Dummy construction for: degree, sex, marital status, belief in life after death and race
4. Results

Time series of religious activity

The Dickey/Fuller-Test and the Correlogramm of (partial) autocorrelation

- no deterministic trend
- random walk without drift

Ordered logit regression: Odds ratios

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Religious activity</td>
<td>Odds Ratio</td>
<td>Odds Ratio</td>
<td>Odds-Ratio</td>
<td>Odds Ratio</td>
</tr>
<tr>
<td>Wagerate ($/h)</td>
<td>0.97 (1.992)</td>
<td>0.98 (-1.756)</td>
<td>1.00 (0.402)</td>
<td>1.06 (0.129)</td>
</tr>
<tr>
<td>Sex</td>
<td>1.09 (0.902)</td>
<td>2.12 (4.886)</td>
<td>2.68 (1.847)</td>
<td>2.94 (2.952)</td>
</tr>
<tr>
<td>Age</td>
<td>1.03 (5.346)</td>
<td>1.02 (5.507)</td>
<td>1.00 (-1.144)</td>
<td>1.00 (0.163)</td>
</tr>
<tr>
<td>Number of children</td>
<td>1.03 (0.897)</td>
<td>0.97 (-0.591)</td>
<td>1.18 (3.311)</td>
<td>1.12 (1.823)</td>
</tr>
<tr>
<td>Race</td>
<td>1.78 (2.233)</td>
<td>1.37 (-1.902)</td>
<td>1.94 (3.951)</td>
<td>2.88 (4.786)</td>
</tr>
<tr>
<td>Marital</td>
<td>0.89 (0.632)</td>
<td>1.28 (1.231)</td>
<td>1.29 (1.503)</td>
<td>1.98 (2.854)</td>
</tr>
<tr>
<td>Separated/Divorced</td>
<td>0.49 (0.148)</td>
<td>1.04 (-0.098)</td>
<td>1.17 (-1.534)</td>
<td>0.81 (-0.796)</td>
</tr>
<tr>
<td>belief in life after deaths</td>
<td>2.65 (5.946)</td>
<td>1.38 (3.331)</td>
<td>1.38 (3.899)</td>
<td>1.59 (2.556)</td>
</tr>
<tr>
<td>Highschool</td>
<td>1.83 (3.913)</td>
<td>1.05 (0.225)</td>
<td>2.31 (5.573)</td>
<td>0.98 (-0.696)</td>
</tr>
<tr>
<td>Bachelor College</td>
<td>0.91 (-0.166)</td>
<td>2.21 (2.154)</td>
<td>2.72 (3.272)</td>
<td>1.06 (0.156)</td>
</tr>
<tr>
<td>Graduate</td>
<td>2.76 (3.956)</td>
<td>4.31 (1.306)</td>
<td>6.73 (5.620)</td>
<td>1.82 (1.968)</td>
</tr>
<tr>
<td>Party identity</td>
<td>1.87 (2.281)</td>
<td>2.47 (2.969)</td>
<td>6.16 (5.645)</td>
<td>2.48 (1.798)</td>
</tr>
</tbody>
</table>

Pseudo R-Squared: 0.0797
Number of observation: 573

4. Results
4. Results

Ordered logit regression

- For all four observations the thresholds are similar

- Only the variables belief in life after death and degree of graduate have significant effects on religious activity for all moments

- Pseudo-$R^2$: the highest value in 2004
  ⇒ religious activity is best represented and explained through the theoretical approaches of allocation of time and religious human capital

5. Summary and Discussion

The main results

- No confirmation of the statement of „fundamental christianity“
  ⇒ religious activity doesn’t follow a declining trend
  ⇒ random walk: only a tendency of declining

- No definitive confirmation of the allocation of time and religious human capital models
  ⇒ effects of some determinants contradict the postulated direction
  ⇒ effects are changing with time
5. Summary and Discussion

Methodological Problems

- Interpretation of time series analysis
  ➤ in a statistical sense time series analysis is not a safe method
  ➤ adaptation of time series with different processes and orders
  ➤ different possibilities of interpretations of the results

- Wagerate for unemployed and homework
  ➤ by chance misspecification of the model because of selectivity
  ➤ threat of intern and extern validity, and biased estimation results

- Falling Number in the ORM
  ➤ a lot of observations lost
  ➤ type II error (beta-error) increases
  ➤ decision for the nullhypothesis although the alternative hypothesis
    would have been right

Discussion

- Further theoretical determinants
  ➤ time series: relationship between religious activity and
    other time series like rates of fertility or education
  ➤ terms of interaction for analyzing age-wage-profiles
    or life-cycle-profiles
  ➤ effects of health, e.g. psychical vs. physical health,
    smoking, drinking
  ➤ geographical determinants, e.g. urban vs. rural regions
Appendix

Abhängige Variable (ordinales Skalenniveau)

<table>
<thead>
<tr>
<th>Religiöse Aktivität (attend)</th>
<th>0</th>
<th>Nie</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>Weniger als einmal im Jahr</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Einmal im Jahr</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Mehr als ein Mal in der Woche</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Fast jede Woche</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Jede Woche</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Mehrmals pro Woche</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Keine Angabe</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Weiß nicht</td>
</tr>
</tbody>
</table>

Unabhängige Variablen

- Metrische Variablen
  - wage: Lohn in $ pro Stunde
  - age1: Alter der Befragten in Jahren

- Dummy-(1,0)-Variablen
  - degree1: Befragte mit High School Abschluss
  - degree2: Befragte mit Junior College Abschluss
  - degree3: Befragte mit Bachelor Abschluss
  - degree4: Befragte mit Graduierten Abschluss
  - marital1: verheiratet
  - marital2: verwitwet
  - marital3: getrennt lebend oder geschieden

- zeitreihe variable
  - wage: Lohnrate
  - age1: Alter in Jahren


<table>
<thead>
<tr>
<th>Dummy-Variablen</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>degree1</td>
<td>667</td>
<td>30</td>
<td>128</td>
<td>46</td>
<td>53.23</td>
<td>2.39</td>
<td>10.22</td>
<td>3.67</td>
</tr>
<tr>
<td>degree2</td>
<td>53</td>
<td>3.89</td>
<td>10.22</td>
<td>3.67</td>
<td>10.22</td>
<td>3.67</td>
<td>10.22</td>
<td>3.67</td>
</tr>
<tr>
<td>degree4</td>
<td>53</td>
<td>3.89</td>
<td>10.22</td>
<td>3.67</td>
<td>10.22</td>
<td>3.67</td>
<td>10.22</td>
<td>3.67</td>
</tr>
</tbody>
</table>

Sex

<table>
<thead>
<tr>
<th>Sex (Ref.Kat: männlich)</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>sex1</td>
<td>690</td>
<td>55.07</td>
<td>712</td>
<td>57.65</td>
<td>1234</td>
<td>55.91</td>
<td>1294</td>
<td>52.48</td>
</tr>
</tbody>
</table>

Race

<table>
<thead>
<tr>
<th>Race (Ref.Kat: europ. Herkunft)</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>race1</td>
<td>145</td>
<td>11.57</td>
<td>194</td>
<td>15.71</td>
<td>436</td>
<td>18.41</td>
<td>534</td>
<td>22.80</td>
</tr>
</tbody>
</table>

Marital

<table>
<thead>
<tr>
<th>Marital (Ref.Kat: Single)</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>marital1</td>
<td>880</td>
<td>49</td>
<td>123</td>
<td>70.23</td>
<td>704</td>
<td>34.11</td>
<td>1391</td>
<td>55.91</td>
</tr>
<tr>
<td>marital2</td>
<td>49</td>
<td>2.60</td>
<td>123</td>
<td>70.23</td>
<td>704</td>
<td>34.11</td>
<td>1391</td>
<td>55.91</td>
</tr>
<tr>
<td>marital3</td>
<td>92</td>
<td>5.00</td>
<td>123</td>
<td>70.23</td>
<td>704</td>
<td>34.11</td>
<td>1391</td>
<td>55.91</td>
</tr>
</tbody>
</table>

Postlife

<table>
<thead>
<tr>
<th>Postlife (Ref.Kat: kein Glaube)</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>postlife1</td>
<td>843</td>
<td>67.28</td>
<td>1206</td>
<td>48.47</td>
<td>1206</td>
<td>48.47</td>
<td>1206</td>
<td>48.47</td>
</tr>
</tbody>
</table>

Party

<table>
<thead>
<tr>
<th>Party (Ref.Kat: keine Partei)</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>party1</td>
<td>239</td>
<td>19.07</td>
<td>287</td>
<td>23.24</td>
<td>693</td>
<td>27.85</td>
<td>684</td>
<td>28.44</td>
</tr>
</tbody>
</table>

Zeitreihe variablen

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>wage</td>
<td>658</td>
<td>743</td>
<td>1637</td>
<td>1315</td>
</tr>
<tr>
<td>age1</td>
<td>1235</td>
<td>1235</td>
<td>2488</td>
<td>2488</td>
</tr>
</tbody>
</table>

Appendix

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>wage</td>
<td>658</td>
<td>743</td>
<td>1637</td>
<td>1315</td>
</tr>
<tr>
<td>age1</td>
<td>1235</td>
<td>1235</td>
<td>2488</td>
<td>2488</td>
</tr>
<tr>
<td>kidscount</td>
<td>1250</td>
<td>1221</td>
<td>2494</td>
<td>2494</td>
</tr>
</tbody>
</table>
Appendix

Residuen-Autokorrelationsfunktion AR(1)
Ljung-Box Q' = 8.7541
Freiheitsgrade = 8, p-Wert = 0.3635
1) 0.2180 2) 0.0173 3) 0.1789 4) -0.2552 5) -0.3382 6) -0.0750
7) -0.0335 8) -0.0704
5%-kritischer Wert: 1.96/T^0.5 = 0.370405

Residuen-Autokorrelationsfunktion AR(0)
Ljung-Box Q' = 7.1529
Freiheitsgrade = 8, p-Wert = 0.5202
1) -0.0377 2) -0.3657 3) 0.1867 4) -0.0185 5) -0.0870 6) 0.1549
7) 0.1013 8) 0.0537
5%-kritischer Wert: 1.96/T^0.5 = 0.357845
## Appendix

<table>
<thead>
<tr>
<th>Jahr</th>
<th>Religiöse Aktivität</th>
<th>Prognose</th>
<th>Std. Fehler</th>
<th>95%-Konfidenzintervall</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>-</td>
<td>3,72</td>
<td>0,1016</td>
<td>(3,51761, 3,91982)</td>
</tr>
<tr>
<td>2006</td>
<td>-</td>
<td>3,72</td>
<td>0,1288</td>
<td>(3,40718, 3,97288)</td>
</tr>
<tr>
<td>2007</td>
<td>-</td>
<td>3,72</td>
<td>0,1539</td>
<td>(3,41746, 4,02654)</td>
</tr>
<tr>
<td>2008</td>
<td>-</td>
<td>3,72</td>
<td>0,1749</td>
<td>(3,37647, 4,06189)</td>
</tr>
<tr>
<td>2009</td>
<td>-</td>
<td>3,72</td>
<td>0,1927</td>
<td>(3,32002, 4,16876)</td>
</tr>
</tbody>
</table>