# Protestantism As a Rational Choice

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# Protestantism and Economics

Positive relationship between economic progress and Protestantism

- ▶ The Protestant Ethic (Weber, 1905)
  - ▶ Monastic asceticism v.s. Work ethic
- ▶ Social Ethics (Arrunada, 2010 EJ)
  - ▶ Strict monitoring
  - ▶ Support political/legal institutions
  - ▶ Homogenous values
- ▶ Literacy and Human Capital (Becker and Woessmann, 2009 QJE)
  - ▶ Emphasis on reading the bible –> Higher investment in literacy and human capital

Common View/Assumption: Reformation was exogenous to economic incentives, No positive selection into Reformation

# Determinants of Protestantism

Diffusion of Reformation like propagation of a wave caused by a stone thrown into the water (distance to Wittenberg)
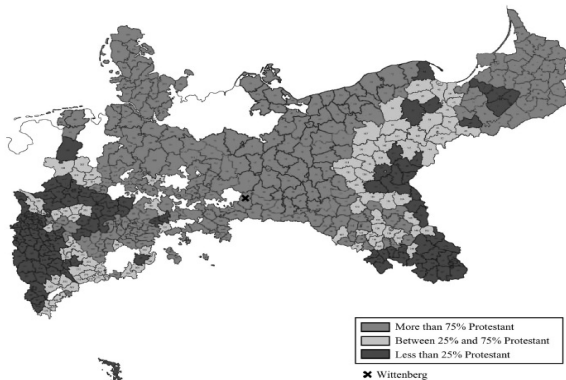


FIGURE III
Protestantism in Nineteenth-Century Prussia
County-level depiction based on 1871 Population Census. See Appendix I for data details.

Figure: Source: Becker and Woessmann, 2009

# Determinants of Protestantism

The spatial pattern is explained by:
- Costs of traveling and diffusion of information (Becker and Woesmann, 2009 QJE)
  - Rubin (2011, ReStat) shows that availability of printing press in a city increased the probability of conversion.
- Strategic neighborhood interactions (Cantoni, 2012 EJ)

Minor role for historical and economic background (except indulgences due to the reconstruction of St. Peter's Basilica)

# Our Contribution

Argument:

- Reformation can also be perceived as an institutional change
- The regions which would benefit more from such a change were more likely to convert
- The incentives should be evaluated in the agriculture-based Malthusian economy.
  - Agricultural productivity determines the potential output (Agriculture based)
  - Population (density) reveals actual realization (Malthusian economy)
  - Institutional appropriateness maps economic potential to actual output

# Our Contribution

The rulers of the regions:
- with higher agricultural potential
- could not materialize this potential, due to low appropriateness of institutions, with lower population

were more likely to adopt Reformation.

We present this idea in a model of princely Reformation and provide supporting empirical evidence.

# Reformation as an Institutional Change

Institutions: legitimate (and sometimes legal) ways of distributing duties/obligations and rights/privileges

- Church ordinances (*Ordnungen*):
  - Marriage ordinances: marriage and family relations
  - Disciplinary ordinances: moral offenses
  - School ordinances: public education of children
  - Poor ordinances: relief of the poor, the sick, widows and orphans, the homeless, the unemployed.

The Protestant Reformations brought all within the competence of the secular authorities which were formerly in the Competence of Catholic Church (Harold Berman (2006)).

# Regional Sovereignty

A period characterized by intensifying demand for regional autonomy.

Diet of Worms (1495): Limits the power of the emperor
Peace of Augsburg (1555): Whose region, his religion (*Cuius regio, eius religio*)
Peace of Westphalia (1648): Marks the birth of the modern "nation-state" and mutual recognition sovereignty.

Eberhard Isenmann (1999):

> It was the coincidence of **long-term financial and political decline** with a new, **severe and almost permanent military threat** and an **urgent demand for constitutional reform** in the fifteenth century that created the context in which early modern taxation would develop.

M.Iyigun (2008 QJE): Luther and Suleyman

# Luther's Contribution

*"If I had never taught or done anything else than I had enhanced and illuminated secular rule and authority... this alone should deserve thanks... Since the time of the apostles no doctor or writer, no theologian or lawyer has confirmed, instructed, and comforted secular authority more glorious and clearly than I was able to do through special divine grace."*

Marthin Luther, 1533

# Princes' Motivation

Bonney (1991):

> *Luther had a powerful, if an unexpected, protector. Elector Frederick the Wise of (Ernestine) Saxony was a paragon of late medieval piety. If he ever read Luther's ninety-five theses about indulgences, he would have had some qualms about offering his support, chiefly since he himself had accumulated Papal indulgences for 127799 years in purgatory. But politics, rather than religious belief governed the elector's behaviour...* **Finally, as with all the princes of the Holy Roman Empire, he wanted to maintain his independence from the Emperor**.

# Model Setup

- Overlapping-generations economy in discrete time
  - Individuals live for two periods (childhood and adulthood) and each individual has a single parent
  - Children are supported by their parents and do not participate in the labor force
  - Adults work and allocate their income between child rearing and consumption
- $S$ regional economies with an urban core surrounded by a rural hinterland. The regions differ in
  - agricultural productivity ($h_s$)
  - appropriateness of institutions ($\lambda_s$)
  - arable land endowment ($Z_s$)
- Goods and labor markets are segregated across regions and free mobility within a region.

# Preferences

Utility function:

$$U(c_t^u, c_t^r, n_t) = (c_t^u)^\theta (c_t^r)^\gamma n_t^{1-\theta-\gamma}, \quad \theta, \gamma \in (0,1), \ \theta + \gamma < 1 \tag{0.1}$$

where

$c_t^u$ denotes the consumption level of urban good
$c_t^r$ denotes the consumption level of rural good
$n_t$ is the number of children per person

Budget constraint:

$$p_t^u c_t^u + c_t^r + \rho n_t \leq y_t. \tag{0.2}$$

where

$y_t$ is the per capita income
$p_t^u$ is the price of urban good
$\rho$ is the cost of child-rearing

Agricultural good is the numeraire.

# Production

Rural sector produce goods using land and labor with constant returns to scale technology whereas the urban sector uses only labor:

$$Y^r_{st} = \lambda^\alpha_s \left(h_s Z_s\right)^\alpha \left(L^r_{st}\right)^{1-\alpha}, \quad \alpha \in (0,1), \qquad (0.3)$$
$$Y^u_{st} = \lambda^\alpha_s L^u_{st}, \qquad (0.4)$$

where

$Y^r_{st}$ is the level of rural output
$Y^u_{st}$ is the level of urban output
$\lambda_s$ is the appropriateness of institutions
$L^i_{st}$ is the labor employed in sector $i \in \{u, r\}$.

# Equilibrium

Utility maximization and Cobb-Douglas preferences:

$$c_t^u = \theta \frac{y_t}{p_t^u}, \tag{0.5}$$
$$c_t^r = \gamma y_t,$$
$$n_t = (1 - \theta - \gamma) \frac{y_t}{\rho}.$$

Individuals earn their average product and goods market clear:

$$\frac{L_t^u}{L_t^r} = \frac{\theta}{\gamma}. \tag{0.6}$$

Urbanization rate is the same across regions and independent of the productivity levels due to Cobb-Douglas preferences.

# Population Dynamics

Each individual has a single parent. The population level at time $t$, $L_t$, is given by the total number of children raised by the previous cohort:

$$L_t = n_{t-1} L_{t-1}. \tag{0.7}$$

Using the optimal number of children, per capita income level and the urbanization rate, we obtain:

$$L_{st} = \left( \frac{1 - \theta - \gamma}{\rho} \right) \left( \frac{\lambda_s h_s Z_s}{L_{t-1}^r} \right)^{\alpha} L_{s,t-1},$$

$$L_{st} = \left( \frac{\gamma + \theta}{\gamma} \right)^{\alpha} \left( \frac{1 - \theta - \gamma}{\rho} \right) (\lambda_s h_s Z_s)^{\alpha} (L_{s,t-1})^{1-\alpha} \tag{0.8}$$

Population ceases to grow in the long-run due to diminishing returns to labor in the rural sector.
Inada conditions satisfied $->$ unique steady-state with long-run population $(\bar{L}_s)$:

$$\bar{L}_s = \Omega \lambda_s h_s Z_s, \tag{0.9}$$

where $\Omega = \left( \frac{\gamma + \theta}{\gamma} \right) \left( \frac{1 - \theta - \gamma}{\rho} \right)^{1/\alpha}$.

# Malthusian Outcome

Using steady-state population level, regional output $\bar{Y}_s$, is given as a multiple of the total effective land endowment:

$$\bar{Y}_s = \Phi \lambda_s h_s Z_s, \qquad\qquad (0.10)$$

where $\Phi = \frac{1}{\gamma} \left( \frac{1-\theta-\gamma}{\rho} \right)^{\frac{1-\alpha}{\alpha}}$.

In the long-run, per-capita income is at subsistence, $\bar{Y}_s/\bar{L}_s = \Phi/\Omega$ and is the same across regions as in (Ashraf and Galor AER 2011).

# Princes' Problem

At time $T$ (at the long-run Malthusian equilibrium), the princes are presented a new alternative governance structure.

Reformation, if successful, increases regional autonomy and enables to device institutions more compatible with regional necessities.

Conditional on the conversion decision:

$$\tilde{\lambda}_s = \begin{cases} \bar{\lambda} & \text{with prob. } p \\ \lambda_s & \text{otherwise} \end{cases} \tag{0.11}$$

Reformation is also costly and a fraction, $\mu$, of the regional output is foregone during conversion, with $0 < \mu < 1$.

# Princes' Problem

The ruler maximizes the present value of net regional output by deciding on whether to adopt protestantism or not.

$$\underset{R \in \{0,1\}}{\text{maximize}} \ v_r(\lambda_s, h_s, Z_s) = \Phi \left[ \lambda_s h_s Z_s + \beta E[\tilde{\lambda}_s h_s Z_s] - R\mu \bar{Y}_s \right]$$

The ruler converts to Protestantism if

$$\lambda_s < \lambda^* \equiv \frac{p\beta\bar{\lambda}}{\mu + \beta p}, \tag{0.12}$$

i.e. when the appropriateness of institutions is below a cut-off value.
Using the total income level at the Malthusian equilibrium, we can express $\lambda_s$ in terms of observables,

$$\lambda_s = \frac{\theta + \gamma}{\theta \Omega} \frac{L_s^u}{h_s Z_s}. \tag{0.13}$$

# Princes' Problem

The ruler converts to Protestantism if

$$R = \begin{cases} 1 & \text{if } \frac{\theta+\gamma}{\theta\Omega} \frac{L_s^u}{h_s Z_s} < \frac{p\beta\bar{\lambda}}{\mu+\beta p} \\ 0 & \text{otherwise} \end{cases} \tag{0.14}$$

*Ceteris paribus*, the likelihood of conversion is
- increasing in the agricultural potential
- decreasing in the level of urban population.

Note: Arable land is unobservable.

# Empirical Specification

$$Protestant_i = \beta_0 + \beta_1 AgrPot_i + \beta_2 ln(UrbPop)_i + \gamma X_i + \varepsilon_i \qquad (0.15)$$

where

$Protestant_i$ is a binary variable which is 1 if a church ordinance was drafted or introduced for the new Protestant state church by 1600, comes from Cantoni (2012)

$AgrPot_i$ measures the probability of the region's being cultivated based on its climatic suitability (growing degree days and moisture index) and soil quality (soil carbon density and soil pH in the top 30 cm of the soil), compiled from Ramankutty et. al. (2002) comes from Bosker et. al. (2012)

$ln(UrbPop)_i$ is the logged urban population of the city in 1500, comes from Bairoch et. al. (1988).

**Expectation**: $\beta_1 > 0$ and $\beta_2 < 0$.

## Table: Summary Statistics - City Level

| Variables | Mean | Std. Dev. | Mean Catholic | Mean Protestant | t-stat |
|---|---|---|---|---|---|
| Protestant by 1600 | 0.71 | 0.46 | 0 | 1 | - |
| **Agricultural Potential** | **0.6** | **0.22** | **0.5** | **0.64** | **-2.21** |
| **Ruggedness** | **57.12** | **95.62** | **113.88** | **34.17** | **2.18** |
| Latitude | 50.77 | 1.87 | 49.26 | 51.38 | -4.81 |
| Longitude | 10.58 | 2.43 | 10.11 | 10.76 | -0.88 |
| Roman Road (hub) | 0.17 | 0.38 | 0.37 | 0.09 | 2.34 |
| Roman Road (no hub) | 0.12 | 0.33 | 0.21 | 0.09 | 1.2 |
| River | 0.52 | 0.5 | 0.47 | 0.53 | -0.42 |
| **Population in 1500 (log)** | **1.68** | **1.11** | **1.95** | **1.58** | **1.31** |
| Population growth 1300-1500 | 38.67 | 70.41 | 20.56 | 45.99 | -1.23 |
| City age | 6.68 | 3.9 | 8.59 | 5.91 | 2.16 |
| University | 0.12 | 0.33 | 0.26 | 0.06 | 1.81 |
| Ecclesiestical | 0.18 | 0.39 | 0.42 | 0.09 | 2.72 |
| Monasteries (p.c.) | 0.83 | 1.24 | 1.18 | 0.69 | 1.32 |
| Free Imperial City | 0.21 | 0.41 | 0.16 | 0.23 | -0.72 |
| Hanseatic | 0.21 | 0.42 | 0.11 | 0.26 | -1.55 |
| **Distance to Wittenberg** | **2.93** | **1.44** | **4.15** | **2.44** | **5.41** |
| Augustinian Monastries | 0.27 | 0.45 | 0.47 | 0.19 | 2.15 |
| Printing Press | 0.26 | 0.44 | 0.32 | 0.23 | 0.65 |

# Results-City Level

| | (1) Agriculture | (2) + Geography | (3) + Economy | (4) + Institutions | (5) + Information | (6) + Trade Pot. |
|---|---|---|---|---|---|---|
| **Agricultural potential** | **0.644**** | **0.614***** | **0.681***** | **0.673***** | **0.643***** | **0.614***** |
| | (0.257) | (0.198) | (0.226) | (0.172) | (0.189) | (0.196) |
| **Urban potential** | | | | | | **0.521**** |
| | | | | | | (0.247) |
| Latitude | | 0.118*** | 0.114*** | 0.112*** | 0.033 | 0.076* |
| | | (0.022) | (0.037) | (0.037) | (0.034) | (0.038) |
| **Population at 1500 (log)** | | | **-0.061*** | **-0.118**** | **-0.099*** | **-0.085*** |
| | | | (0.036) | (0.054) | (0.051) | (0.048) |
| Population growth (1300-1500) | | | 0.002** | 0.001** | 0.001 | 0.001* |
| | | | (0.001) | (0.000) | (0.001) | (0.001) |
| City ecclesiastical at 1500 | | | | -0.296** | -0.352*** | -0.348*** |
| | | | | (0.125) | (0.126) | (0.121) |
| Monastries per capita | | | | -0.103*** | -0.094*** | -0.094*** |
| | | | | (0.027) | (0.027) | (0.031) |
| **Distance to Wittenberg** | | | | | **-0.136***** | **-0.119***** |
| | | | | | (0.036) | (0.035) |
| Constant | 0.327 | -6.100*** | -5.729*** | -5.202*** | -0.398 | -3.809 |
| | (0.199) | (1.118) | (2.034) | (1.939) | (1.898) | (2.355) |
| Observations | 66 | 66 | 66 | 66 | 66 | 66 |
| $R^2$ | 0.093 | 0.366 | 0.457 | 0.624 | 0.677 | 0.701 |

Robust standards errors clustered at the territory level in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

# Robustness Tests

- Trade can disrupt the Malthusian equilibrium and is a different source of income:

$$UP_i = \sum_{j \neq i}^{N} \frac{Pop_j}{D_{ij}} \qquad (0.16)$$

- Improper choice of the unit of analysis: Territory level regressions
  - Military war tax (*Reichsmatrikel*), a better measure of regional income.
- Agricultural potential might be endogenous: Ruggedness as in (Nunn and Puga 2012, ReStat)
- Sub-samples and heterogeneous effects

# Results-Territory Level

| | (1) Agriculture | (2) + Geography | (3) + Economy | (4) + Institutions | (5) + Information | (6) + Trade Pot. |
|---|---|---|---|---|---|---|
| **Agricultural potential** | 0.874** | 1.020*** | 0.883** | 0.799*** | 0.736** | 0.662* |
| | (0.342) | (0.307) | (0.362) | (0.277) | (0.334) | (0.338) |
| Urban potential | | | | | | 0.232 |
| | | | | | | (0.272) |
| Latitude | | 0.098*** | 0.056 | 0.049 | 0.050 | 0.071 |
| | | (0.030) | (0.046) | (0.039) | (0.047) | (0.056) |
| Longitude | | 0.053* | 0.071** | 0.066* | 0.064 | 0.077 |
| | | (0.028) | (0.031) | (0.035) | (0.043) | (0.047) |
| Population at 1500 (log) | | | -0.060 | -0.098 | -0.109 | -0.098 |
| | | | (0.062) | (0.077) | (0.090) | (0.096) |
| **Reichsmatrikel** | | | -0.114** | -0.138*** | -0.131** | -0.134** |
| | | | (0.055) | (0.049) | (0.054) | (0.053) |
| Elector | | | | 0.269* | 0.247 | 0.205 |
| | | | | (0.148) | (0.178) | (0.164) |
| City ecclesiastical at 1500 | | | | -0.499*** | -0.498*** | -0.479*** |
| | | | | (0.167) | (0.172) | (0.177) |
| **Distance to Wittenberg** | | | | | -0.014 | -0.016 |
| | | | | | (0.077) | (0.076) |
| Constant | 0.104 | -5.498*** | -3.227 | -2.574 | -2.522 | -4.024 |
| | (0.238) | (1.501) | (2.439) | (2.167) | (2.880) | (3.532) |
| Observations | 49 | 49 | 49 | 49 | 49 | 49 |
| $R^2$ | 0.115 | 0.280 | 0.408 | 0.626 | 0.629 | 0.635 |

Robust standards errors clustered at the upper-territory level in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

# Ruggedness-City Level

| | (1) Ruggedness | (2) + Geography | (3) + Economy | (4) + Institutions | (5) + Information | (6) + Trade Pot. | (7) + Agriculture |
|---|---|---|---|---|---|---|---|
| **Ruggedness** | -0.002*** | -0.001** | -0.001** | -0.001** | -0.001* | -0.001* | -0.000 |
| | (0.000) | (0.000) | (0.001) | (0.000) | (0.000) | (0.000) | (0.000) |
| **Urban potential** | | | | | | 0.574** | 0.522** |
| | | | | | | (0.275) | (0.249) |
| **Agricultural potential** | | | | | | | 0.589*** |
| | | | | | | | (0.211) |
| Latitude | | 0.107*** | 0.095** | 0.104** | 0.020 | 0.067 | 0.071* |
| | | (0.030) | (0.039) | (0.040) | (0.038) | (0.045) | (0.040) |
| Longitude | | 0.032* | 0.015 | -0.004 | -0.045** | 0.005 | 0.015 |
| | | (0.018) | (0.015) | (0.020) | (0.018) | (0.028) | (0.026) |
| **Population at 1500 (log)** | | | -0.041 | -0.101* | -0.103* | -0.087* | -0.080 |
| | | | (0.037) | (0.055) | (0.054) | (0.050) | (0.051) |
| Population growth (1300-1500) | | | 0.002** | 0.001** | 0.001 | 0.001* | 0.001* |
| | | | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| City ecclesiastical at 1500 | | | | -0.300* | -0.365** | -0.360** | -0.349*** |
| | | | | (0.154) | (0.154) | (0.148) | (0.124) |
| Monastries per capita | | | | -0.092*** | -0.084*** | -0.085** | -0.093*** |
| | | | | (0.033) | (0.031) | (0.036) | (0.031) |
| **Distance to Wittenberg** | | | | | -0.153*** | -0.132*** | -0.118*** |
| | | | | | (0.040) | (0.037) | (0.035) |
| Constant | 0.816*** | -5.013*** | -4.085* | -4.185* | 0.913 | -2.891 | -3.570 |
| | (0.063) | (1.565) | (2.104) | (2.109) | (2.087) | (2.803) | (2.472) |
| Observations | 66 | 66 | 66 | 66 | 66 | 66 | 66 |
| $R^2$ | 0.145 | 0.312 | 0.409 | 0.561 | 0.626 | 0.655 | 0.702 |

Robust standards errors clustered at the territory level in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

# Conclusion

- Rulers of the regions which were smaller in economic terms but having higher economic potential were more likely to adopt Reformation in the Holy Roman Empire.
- This is consistent with an explanation based on institutional appropriateness.
- The first evidence on an economic motive for the adoption of Protestantism.
- We document an important source of positive selection into Reformation which should be addressed while studying the Protestantism-Growth relationship.