Setting
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Causal Effect of Protestantism
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Controlled Direct Effect
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Estimates
○○

Conclusion
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Was Weber Wrong? A Human Capital Theory of Protestant Economic History

Sascha o.Becker and Ludger Woessmannn

Paul Schäfer

December 5, 2018

Weber's Theory

- Protestants are more prosperous
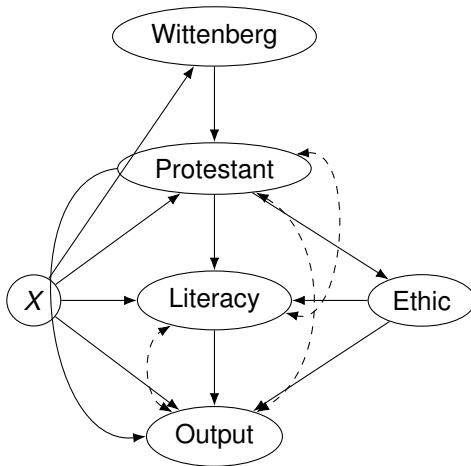- Claim 1: Protestantism causes prosperity
- Claim 2: The effect is mediated by:

  Weber: The difference has ethical reasons (e.g.: Work Ethik, Beruf as a Calling)

  Becker and Woessmann: Protestants accumulate more human capital

Protestantism and Education

- Believers should read and interpret the bible for themselves (with help from the holy spirit)
- "Quite obviously, if one wants to read the Bible, one must be able to read" (Becker and Woessmann, 2007)
- Reformation is one of the key drivers of the German elementary school system
- Luther actively lobbied for expanding education: "Pamphlet To the Councilmen of All Cities in Germany That They Establish and Maintain Christian Schools" and "Sermon on Keeping Children in School"
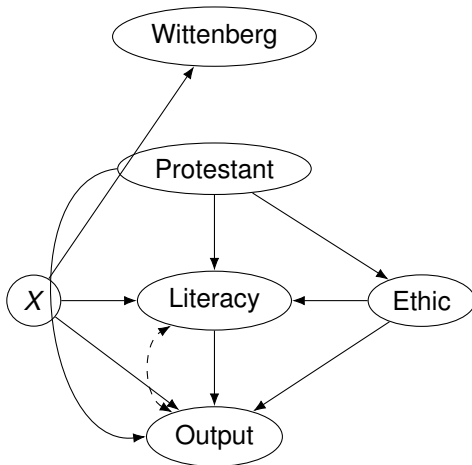
Setting
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Causal Effect of Protestantism
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Controlled Direct Effect
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Estimates
○○

Conclusion
○○

A DAG of Protestantism, Education and Output

$$ACE = P(Y = 1|do(D = 1)) - P(Y = 1|do(D = 0))$$

(Pearl et. al. 2016, S. 128)

Intervention is Conditioning in an Adjusted DAG

$$ACE = P(Y = 1 | D = 1) - P(Y = 1 | D = 0)$$

The Direct Effect of Protestantism I

- Becker and Woessmann argue that most of the effect of protestantism is through output
- In other words the direct controlled effect of protestantism on output with respect to human capital is small

The Direct Effect Cannot be Defined by Conditioning on the Mediator
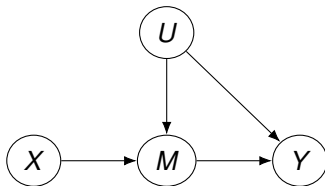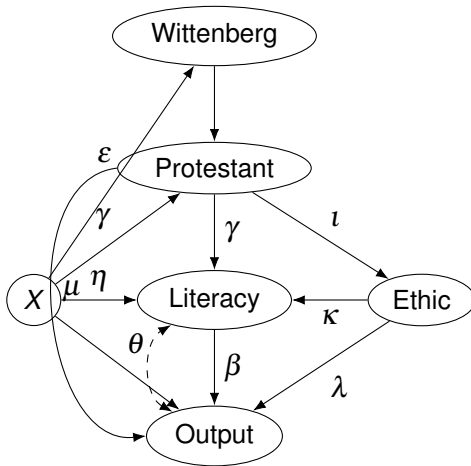

$$\Rightarrow Y \not\perp\!\!\!\perp X \mid M$$

Defining the direct effect as the effect conditional on the mediator results in an effect where there is none.

Definition Controlled Direct Effect (Pearl 2016, S. 136)

$$CDE = P(Y = y | do(X = x), do(M = m))$$
$$- P(Y = y | do(X = x'), do(M = m))$$

Setting
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Causal Effect of Protestantism
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Controlled Direct Effect
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Estimates
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Conclusion
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Imposing Linearity

Setting
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Causal Effect of Protestantism
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Controlled Direct Effect
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Estimates
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Conclusion
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The Direct Effect of Protestantism II
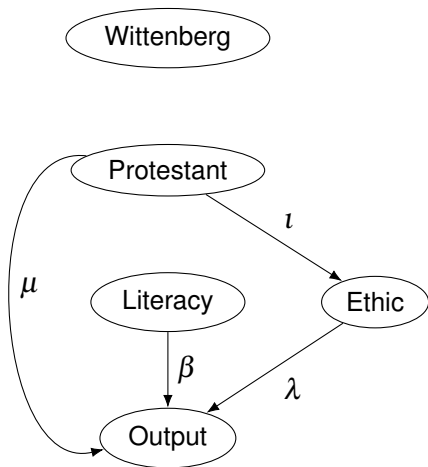
$$\Rightarrow CDE = \mu + \iota \cdot \lambda$$

Calibration I

The structural equation for output implied by the graph is:

$$Output = \nu + \beta * Literacy + \lambda * Ethic + \mu\, Protestant + \varepsilon_1 + \varepsilon_2.$$

Since we act as if we knew β we can re-arrange:

$$Output - \beta * Literacy = \nu + \lambda * Ethic + \mu\, Protestant + \varepsilon_1 + \varepsilon_2.$$

Setting
○○

Causal Effect of Protestantism
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Controlled Direct Effect
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Estimates
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Conclusion
○○

Calibration II
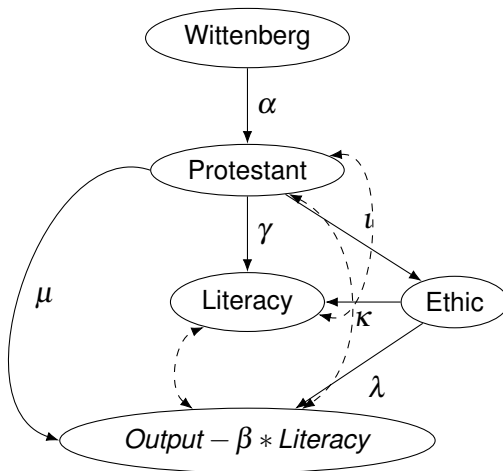
Total Effects of Protestantism

	Literacy	Dist. School >3 km	Income Tax P. C.	Manufac. & Service
OLS	$0.099^{***}(0.01)$	$-0.026^{***}(0.004)$	$0.154^*(0.091)$	$0.035^{**}(0.091)$
IV	$0.189^{***}(0.028)$	$-0.025^{**}(0.011)$	$0.586^*(0.236)$	$0.082^{**}(0.039)$
Mean	0.88	0.03	198	0.34
Unit	Share	Share	Mark·100	Share
Year	1871	1886	1877	1882

Notes: All regressions control for % age below 10, % Jews, % females, % born in municipality, % of Prussian origin, % Average household size, ln(population size) , Population growth 1867-1871; Significance at *10, *5, *1 Percent

Direct Effect of Protestantism on Output

TABLE VI
EFFECT OF PROTESTANTISM ON ECONOMIC OUTCOMES AFTER ADJUSTING
FOR LITERACY: BOUNDING ANALYSIS

	Main outcome	Alternative outcomes	
	Per capita income tax[a]	ln(teacher income)[a]	Share manuf & serv
	Direct: 0.6 (1)	(2)	*Direct: 0.04* (3)
40% below OLS estimate	0.309	0.033	0.027
	(0.226)	(0.047)	(0.036)
20% below OLS estimate	0.216	0.010	0.009
	(0.224)	(0.047)	(0.036)
10% below OLS estimate	0.170	−0.002	−0.0002
	(0.223)	(0.047)	(0.036)
OLS estimate	0.124	−0.014	−0.009
	(0.223)	(0.047)	(0.036)
10% above OLS estimate	0.078	−0.026	−0.018
	(0.222)	(0.047)	(0.036)
20% above OLS estimate	0.031	−0.038	−0.028
	(0.222)	(0.047)	(0.036)
40% above OLS estimate	−0.061	−0.062	−0.046
	(0.223)	(0.048)	(0.036)

Figure: Table VI from Becker and Woessmann (2009)

Conclusion

- Education is an important mediator
- Weber can still be right
- DAGs are useful to define mediation
- Heterogenous effects are discussed more easily in the Roy model

Literature

Becker, Sascha O., and Ludger Woessmann. "Was Weber
wrong? A human capital theory of Protestant economic history."
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A human capital theory of Protestant economic history." (2007),
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Pearl, Judea. "Causality." Causality, by Judea Pearl, Cambridge,
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statistics: a primer. John Wiley & Sons.

Appendix

Timeline

1517	Luther sends his 95 thesis to the archbishop of Mainz
1555	Imperial diet adopted "Cuius regio, eius religio" ("Whose rule, his religion"). Denomination of subjects is decided by their local rulers.
1871-1901	Collection of Prussian municipality level data
1904	Weber published "Die protestantische Ethik und der „Geist" des Kapitalismus. "

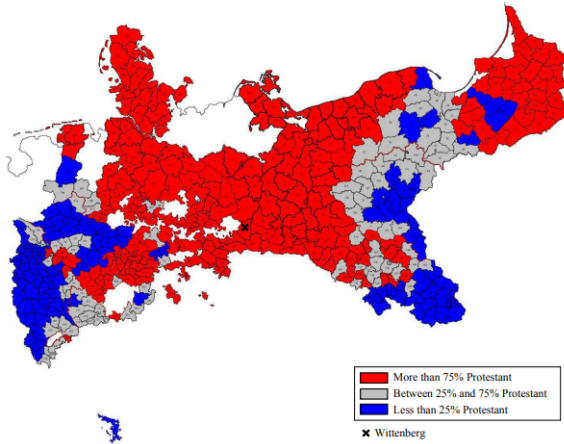# Distance to Wittenberg as an Instrument

Figure: Distance to Wittenberg and protestantism from Becker and Woessmann (2007) Figure 2 (CESIFO WP).

Checking the Exclusion Restriction I

In order to estimate the causal effect of Protestantism by 2SLS

$$(Y_1, Y_0) \perp\!\!\!\perp \text{Wittenberg} \mid X$$

has to hold for $Y \in \{\text{Literacy}, \text{Output}\}$. This holds if it holds in a graph deleting all arrows coming from protestant (By Theorem 3.4.1 of Pearl (2000)).

Checking the Exclusion Restriction II