Reply to Kelly

This short note keeps track of Morgan Kelly's (2021) critique of my paper "*Devotion and Development: Religiosity, Education, and Economic Progress in 19th-Century France*" (AER 2020). Since Kelly's critique keeps changing, I will continue to update this note, summarizing the main points of each version as well as my responses.

While I thank Prof. Morgan Kelly for the reading of my article and for his interest in my results – and I truly believe in the importance of constructive criticism – I would have appreciated a more transparent and data-driven critique of my findings.

Background and answers to Kelly's (2021) main points

I first received an email from Kelly on May 22nd, 2021: he attached a paper (that I denote as K1 – click here to download it) criticizing the findings of my article, and he asked for my comments. Kelly's main points were that:

a) my cross-sectional *department-level* relationship between religiosity and economic development is confounded by living standards;
b) my main measure of religiosity, the share of refractory clergy, is not appropriate.

In my reply to Kelly (May 24th, 2021) I made him aware that his concerns were already addressed in my paper, thus disproving his main points. I specified that:

a) besides running several robustness checks (e.g., accounting for regional differences), I used the more granular variation at the canton level. This includes department FE and ensures that all department-level unobserved factors are controlled for;
b) I perform a careful internal validation of my religiosity measure.[1]

About 10 days later (June 2nd, 2021), I received a second email. Kelly writes: *"I have extensively revised that draft I sent you"* (click here to download Kelly's second draft, K2). Kelly's main changes/additions, based on my replies, are:

c) a completely new section (K2-Section 4) dealing with the canton-level analysis and suggesting that my results are driven by the most populous cantons;
d) further emphasis on the regional differences (compare, K1-Table 6 and K2-Table 7), claiming that my panel results do not hold when excluding half of the country, i.e., 40 out of 80 departments located in the North-East, East, and South-East of France.

These additional critiques are not solid:

c) the sign and significance of the coefficient of interest hold when using Kelly's sample, and the slight decrease in magnitude (which he is concerned about) does not occur when using more systematic methods to control for population (see point 1 and Table R2 in the Appendix below for more details).
d) interacting the share of Catholic schools/students with Kelly's "North and East" dummy (which, however, also includes several Southern departments) indicates that

[1] In addition, the historical and economics literatures provide additional external evidence in favor of my choice (e.g., Tackett, 1986; Murphy, 2015; Franck and Johnson, 2016; Blanc, 2021).

differences across the two parts of France are quantitatively small and statistically insignificant. This suggests that Kelly's findings are not driven by systematic regional differences – as he alleges – but rather by cutting my sample in an arbitrary fashion (see Table R4 in Appendix).

More broadly, besides these selected sample cuts, Kelly's critiques (in both K1 and K2) are the result of "cherry-picking" variables/specifications and of the addition of *ad hoc* department dummies (I provide more details in the Appendix).

Therefore, I am confident that, despite its attempts, Kelly's work still proves that my results hold throughout.

Sincerely,
Mara P. Squicciarini

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Appendix

Let me now give further details on how Kelly's critiques are the result of "cherry-picking" variables/specifications, of selected sample cuts, and of the addition of ad hoc department dummies.

Kelly's first concern is that the relationship between religiosity and economic development is confounded by living standards. In K1, this was entirely based on the cross-sectional department-level regressions. There are at least two reasons why this critique does not hold. First, Squicciarini (2020) uses two outcome variables, i.e., the share of industrial employment and the number of machineries per capita. Kelly's critique is only based on the first outcome (see, K2-Table 1). Table R.1 (below) runs the *same* specifications as K2-Table 1 using machineries per capita. It shows that there is a negative and significant relationship between religiosity and machineries per capita. In the attempt to make this relationship insignificant, Kelly further adds dummies for very selected departments and controls for distance from Paris in days (see K2-Table A.1). The department dummies are not consistent across specifications and their inclusion is not justified throughout. In addition, Squicciarini (2020) already included the physical distance from Paris in km (which is also extensively used in the previous literature).

Second, and most importantly, besides running several robustness checks, since the department-level results can still be confounded by omitted variables, Squicciarini (2020) uses the more granular variation at the canton level. This includes department fixed effects and ensures that all differences across departments are controlled for without running out of degrees of freedom (if one controlled for all variables simultaneously in the department regression) or raising cherry picking concerns (if one included a subset of them one at the time). The analysis strongly confirms the department-level findings. In K2, Kelly also criticizes

the canton-level results. In this case, the concern is that the results are driven by the most populous cantons (see K2-Table 3). The approach of dealing with this potential issue is to exclude the 30 most populous cantons. Despite this sample cut, the coefficient on religiosity stays negative and significant. Kelly, however, is now concerned that the magnitude of the coefficient decreases (from -0.047 to -0.037).[2] First, cutting arbitrarily the sample is not the right way of proceeding. Squicciarini (2020) already controls for population in all specifications. In addition, Table R.2 further explores the role of population using more systematic methods than a sample cut (e.g., including polynomials of this variable, a dummy for those cantons in the 95percentile of the population distribution, or even a dummy for the 30 most populous cantons). All coefficients are extremely stable (about -0.046) and strongly significant. Once again, this proves the robustness of Squicciarini (2020)'s results.

Then, Squicciarini (2020) shows that religiosity is not significantly associated with the share of Catholic schools in 1851 and 1866, but explains their growth between 1866 and 1901. Kelly argues that the inclusion of proxies for demand and supply factors for primary education makes the latter relationship insignificant (K2-Table 5). This is wrong, as their addition leaves the coefficient on religiosity still positive and strongly significant. What makes the relation insignificant is the *ad hoc* inclusion of dummies for selected departments which are not consistent across specifications and not always correctly mentioned. Kelly justifies their introduction in the notes to K2-Table 5 by writing: "*The growth regressions for 1866–1901 have dummies for Aveyron and Lozère (heavy donations) and Hautes-Pyrénées and Pyrénées-Orientales (low growth of Catholic schools).*"[3] However, these are *not* the departments with the *heaviest* donations or the *lowest* growth of Catholic schools, but just some cherry-picked departments with heavy donations or low growth. Table R.3 reproduces the growth results, adding one by one the additional controls suggested by the author, but without including any of the department dummies. It shows that religiosity is positively and significantly associated with the growth in the share of Catholic schools.

Finally, Squicciarini (2020) shows that religious education was negatively associated with industrial development 10 to 15 years later. Kelly suggests that these results are driven by regional differences and that: i) they do not hold when excluding half of the country—i.e., 40 out of 80 departments located in the North-East, East, and South-East of France; ii) the effect becomes much smaller when excluding the West. However, rather than relying on another sample cut, a more systematic way to study this issue is to interact the share of Catholic schools/students with the dummies used in the manuscript, i.e., the North-East dummy (which, however, also includes several Southern departments) and the West dummy. Table R.4 shows that differences across the different parts of France are quantitatively small and statistically insignificant. This suggests that Kelly's findings are not driven by systematic regional differences, but rather by cutting the sample in an arbitrary fashion.

Altogether, these different pieces of evidence show the robustness of Squicciarini (2020).

[2] In addition, running Kelly's specification (as explained in K2) gives a standard error of 0.021. In the Table, he reports a standard error of 0.023.

[3] Despite not being specified in the notes, Kelly's regressions also include a dummy for the *Loire* department.

Table R.1: Replicating Table A1 – without adding ad hoc dummies

Dependent Variable:	Machines per capita, 1891							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share Refractory Clergy	-1.290***	-0.833***	-0.645**	-0.569**	-0.620**	-0.795***	-0.615**	-0.356
	(0.271)	(0.282)	(0.305)	(0.266)	(0.280)	(0.281)	(0.253)	(0.271)
Living Standard			0.389	3.430***	0.279	-0.093	1.173***	0.893***
			(0.489)	(1.171)	(0.193)	(0.211)	(0.313)	(0.247)
Controls	✓	✓	✓	✓	✓	✓	✓	✓
North and East		✓	✓	✓	✓	✓	✓	✓
Coal Distance			✓	✓	✓	✓	✓	✓
R^2	0.42	0.53	0.54	0.58	0.56	0.54	0.60	0.62
Observations	80	80	78	80	80	80	80	80

Notes: This Table replicates Table A.1 of K1 and K2, without including ad hoc department-level dummies or selected variables, but following the specifications of Table 1. All regressions are run at the department level. Controls include the (log) average precipitation and temperature in the 1700-1800 period, an index of pre-industrial activities in France and (log) population in 1891. Living Standard is the (log) agricultural wage in 1852 in col. 3, the (log) soil quality in col. 4, the (log) business tax in 1836 in col. 5, the (log) share of population that was urban in 1836 in col. 6, the (log) average number of doors and windows per house in 1831 in col. 7, the (log) number of patents per capita in 1829 in col. 8. Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table R.2: Canton-level results hold when accounting for population

Dependent Variable:	(Log) Household Expenditure, 1901				
	Original	Pop. Polynomial	95th perc.	Quantiles	30 largest
	(1)	(2)	(3)	(4)	(5)
Share Refractory Clergy	-0.047**	-0.046**	-0.046**	-0.046**	-0.045**
	(0.022)	(0.022)	(0.021)	(0.021)	(0.021)
Population	0.032***		0.020***	0.054***	0.017***
	(0.006)		(0.007)	(0.009)	(0.006)
Department FEs	✓	✓	✓	✓	✓
R^2	0.38	0.39	0.38	0.38	0.39
Observations	1113	1113	1113	1113	1113

Notes: All regressions are run at the canton level and include the (log) distance from Paris in km (as in Squicciarini (2020) and in K2). Col. 1 replicates the original specification. Col. 2 adds the 5th-degree polynomial of the canton population. Col. 3 adds a dummy for those cantons in the top-5th percentile of the canton population distribution. Col. 4 adds dummies for the quantiles of the canton population distribution. Col. 5 adds a dummy for the 30 most populous cantons. Standard errors (clustered at the district level) in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table R.3: Growth of Catholic education and religiosity – without adding ad hoc dummies

Dependent Variable:	Gr. Share Cath. Schools 1866-1901			
	(1)	(2)	(3)	(4)
Share Refractory Clergy	0.318**	0.299**	0.280**	0.287**
	(0.126)	(0.117)	(0.118)	(0.118)
School Target 1833		-0.110	-0.119	-0.124
		(0.105)	(0.108)	(0.110)
Sex Imbalance 1837			0.209**	0.206**
			(0.083)	(0.081)
Donations 1830				-0.004
				(0.029)
Schooling controls	✓	✓	✓	✓
R^2	0.25	0.26	0.33	0.33
Observations	81	81	81	81

Notes: All regressions are run at the department level and control for (log) population in 1866. Schooling controls include enrollment rate in 1866, the (log) number of students per school in 1866, and the (log) number of total schools in 1866. Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table R.4: Catholic education and industrialization – without cutting the sample

Dependent Variable:	Share Industrial Employment, 1871–1911					
	(1)	(2)	(3)	(4)	(5)	(6)
Share Catholic Schools$_{t-10}$	-0.196***	-0.199*	-0.205***			
	(0.068)	(0.109)	(0.072)			
Share Catholic Students$_{t-10}$				-0.195***	-0.148*	-0.194***
				(0.065)	(0.080)	(0.065)
Share Cath. Sch./Stud.*North-East		0.004			-0.059	
		(0.105)			(0.061)	
Share Cath. Sch./Stud.*West			0.073			0.082
			(0.147)			(0.107)
Enrollment Rate$_{t-10}$	0.023	0.023	0.022	0.004	0.007	-0.000
	(0.044)	(0.044)	(0.044)	(0.043)	(0.044)	(0.043)
Students per School$_{t-10}$	-0.085***	-0.085**	-0.084**	-0.087***	-0.085***	-0.082***
	(0.032)	(0.032)	(0.032)	(0.031)	(0.031)	(0.031)
Total Schools$_{t-10}$	-0.067	-0.067	-0.065	-0.054	-0.041	-0.047
	(0.049)	(0.050)	(0.049)	(0.046)	(0.045)	(0.046)
Population$_{t-10}$	0.256***	0.256***	0.256***	0.236***	0.230***	0.230***
	(0.083)	(0.083)	(0.084)	(0.077)	(0.076)	(0.076)
Department FEs	✓	✓	✓	✓	✓	✓
Year FEs	✓	✓	✓	✓	✓	✓
R^2	0.95	0.95	0.95	0.95	0.95	0.95
Observations	729	729	729	648	648	648

Notes: All regressions are run at the department level. Standard errors (clustered at the department level) in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

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