The Consequences of Radical Reform: The French Revolution as a Natural Experiment

Daron Acemoglu   Davide Cantoni   Simon Johnson
James Robinson

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Introduction

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- ▶ Large consensus about the importance of institutions for economic development, but uncertainty about which specific institutions are important.
- ▶ Also little consensus on how institutions change, whether they can be designed, or if they can be reformed externally. Some argue that institutions have to evolve organically (Hayek). Some argue that institutions have to be 'appropriate' (Berkovitz et al., Rodrik).
- ▶ 'Big Bang' or gradual reform?

Exogenous imposition of institutions?

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▶ Disillusion with the experience of institutional reform in Latin America, Africa or former Soviet Union.

▶ But also examples of previous success, for instance Germany and Japan after World War II.

▶ Rare occurrences of exogenous imposition of reforms
  ▶ Therefore focus on quasi-experiments, such as colonial origins and settler mortality (Acemoglu, Johnson, Robinson 2001)

▶ After 1792 French armies invaded and changed/reformed the institutions of many European countries.

Differing views of the French Revolution

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Napoleon Crossing the St. Bernard Pass, c.1801, by Jacques-Louis David

Differing views of the French Revolution

The Shootings of May 3rd 1808 by Francisco Goya

The French Revolution as a Natural Experiment

- ▶ Interesting historical experiment for looking at these questions and related issues because the institutions that the French imposed are central to many debates
    - ▶ Imposition of the Civil Code (Shleifer et al.). Introduction of equality before the law. Basic to social mobility and innovation.
    - ▶ Abolition of feudal and mercantilist institutions such as guilds. Institutionalist literature would see these as prime candidates for dysfunctional institutions (Olson).
    - ▶ Land redistribution from Catholic Church and aristocracy (Tawney).

The French Revolution as a Natural Experiment

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  ▶ Imposition of the Civil Code (Shleifer et al.). Introduction of equality before the law. Basic to social mobility and innovation.
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  ▶ Land redistribution from Catholic Church and aristocracy (Tawney).

▶ French institutions did not evolve organically, were 'inappropriate' and implemented 'Big Bang' style.

▶ Did places which were reformed by the French do relatively better economically in the 19th century?

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▶ We look at 3 possible datasets: (1) Europe's urbanization rates, (2) European GDP per capita data by Maddison, (3) German urbanization rates.

▶ We distinguish 3 forms of treatment: (1) Length of French occupation (in years), (2) a dummy for French control during the Revolutionary period, (3) a dummy for French control during the Napoleonic period.

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▶ First look at reduced-form relationships between treatment and dependent variables. We find quite robust evidence that by 1900 treated places grow faster than untreated places.

▶ We then focus on variation within Germany and code the different types of reforms that took place. This allows us to estimate a first-stage of reforms on treatment and then an IV model. We find similar results.

Urbanization in Europe

Figure 2A: French Revolutionary Armies as Treatment, European Sample

Figure 2B: Napoleonic Armies as Treatment, European Sample
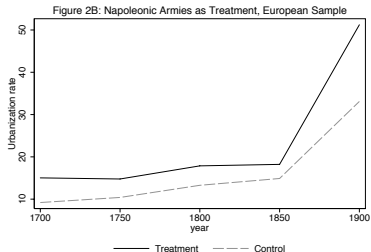
Urbanization in Germany

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Figure 3A: French Revolutionary Armies as Treatment, German Sample

Figure 3B: Napoleonic Armies as Treatment, German Sample

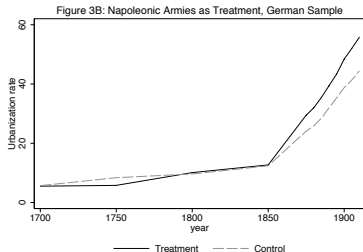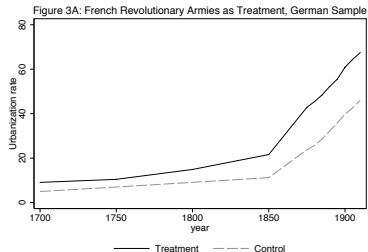# Impact of the French Armies in Europe - Revolutionary Phase

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▶ Revolution occurred in 1789 and after 1792 French armies fought across much of Western Europe in the War of the First Coalition. Invasions of the Rheinland, Nice, Savoy and Austrian Netherlands (Belgium) in 1792.

▶ 1793 sees the Levée on Masse. 1794 Rhineland and Belgium occupied. 1795 Netherlands invaded at Batavian Republic created.

▶ 1796 Napoleon invades Italy and by January 1799 the French either directly controlled the entire Italian peninsula (except Venice which was Austrian) or it was ruled through the satellite republics (Cisalpine, Ligurian, Roman and Parthenopean).

▶ Switzerland annexed in 1798 and Helvetian Republic created.

Impact of the French Armies in Europe - Napoleonic Phase

- ▶ Napoleon becomes first consul in 1799.
- ▶ Hanover occupied in 1803. Holy Roman Empire reorganized into Rheinbund in 1806. The Duchy of Berg was formed in March 1806, the Kingdom of Westphalia in August 1807 and the Duchy of Frankfurt in February 1810. These were run by the French and were formed out of states merged together by Napoleon.
- ▶ Defeat of Prussia at Jena in October 1806 and creation of the Continental System, 1807 Grand Dutchy of Warsaw.
- ▶ 1806 French invade southern Italy (Joachim Murat, husband of Napoleon's sister Caroline, made King), 1808 Spain invaded (Napoleon's elder brother Joseph made King).
- ▶ 1812 defeat in Russia. Collapse of Empire. 1815 Waterloo.

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Institutions of the Ancien Régime

- ▶ Fundamentally hierarchical ('feudal') notion of society where some groups or social orders had privileges, social, political and economic, while others did not. These groups were primarily the monarchy, the aristocracy and the church.

- ▶ These groups had different laws and rights from the general populace and this manifested itself in many important ways.

- ▶ At the bottom of this hierarchy were the peasants and urban poor whose economic and social choices were often highly circumscribed.

- ▶ The same fate was suffered by religious minorities such as Jews who were heavily discriminated against.

- ▶ Urban areas freer but dominated by oligarchies and guilds.

Institutional Reform–Decree of August 4, 1789

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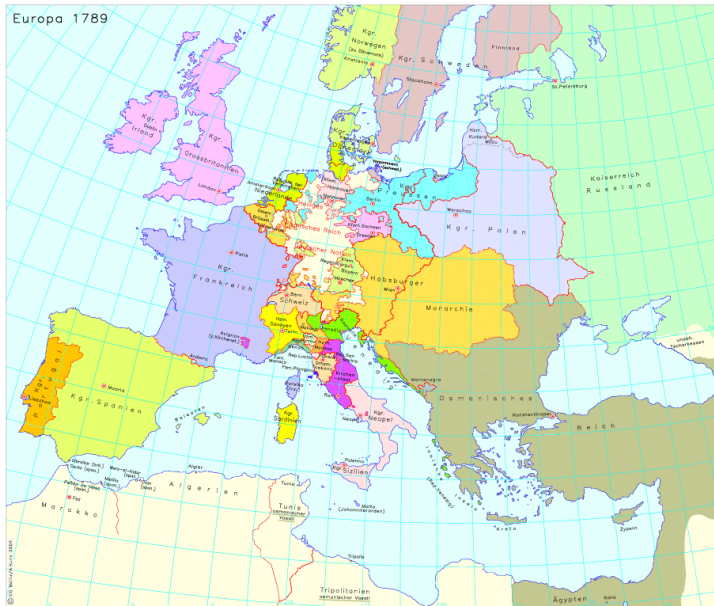Cross-country evidence

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- ► ARTICLE I. The National Assembly hereby completely abolishes the feudal system. It decrees that, among the existing rights and dues, both feudal and censuel, all those originating in or representing real or personal serfdom shall be abolished without indemnification.

- ► IX. Pecuniary privileges, personal or real, in the payment of taxes are abolished forever. Taxes shall be collected from all the citizens, and from all property, in the same manner and in the same form. Plans shall be considered by which the taxes shall be paid proportionally by all, even for the last six months of the current year.

- ► XI. All citizens, without distinction of birth, are eligible to any office or dignity, whether ecclesiastical, civil, or military; and no profession shall imply any derogation.

Cross-Country Evidence - Model

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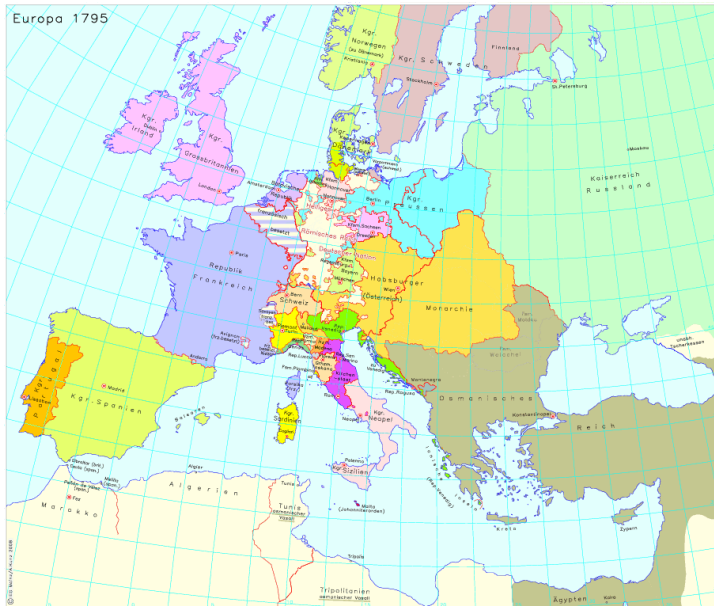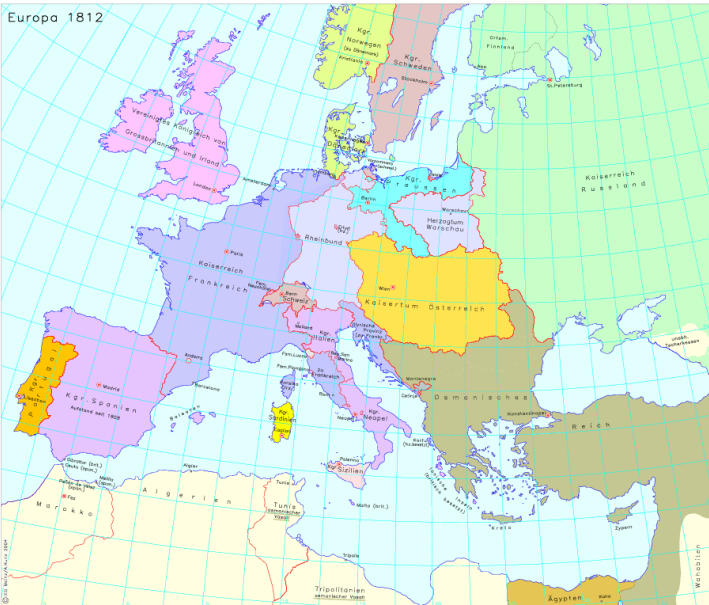Cross-country evidence

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- ▶ Use a panel of 41 countries (pre-unitary states or regions for Germany and Italy) and compute urbanization rates (% of population living in urban areas with 5,000 or more inhabitants)

- ▶ We estimate reduced form models of the following form:

$$y_{jt} = d_t + \delta_j + \sum_{t \in \mathcal{T}^{post}} \alpha_t \cdot D_t \cdot I_j + \sum_{t \in \mathcal{T}^{pre}} \alpha_t \cdot D_t \cdot I_j + \varepsilon_{jt}, \tag{1}$$

- ▶ where y_{jt} is the outcome variable (urbanization, log GDP per capita) in country j at time t, the d_t's denote a full set of time effects, the δ_j's denote a full set of country effects, and ε_{jt} is a disturbance term.

Cross-Country Evidence - Model

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- I_j is the treatment variable - years of French occupation, or a dummy. D_t is a year dummy such that $D_t = 1$ for period t and 0 otherwise.

- The term $\sum_{t \in \mathcal{T}} \alpha_t \cdot D_t \cdot I_j$ estimates a potentially differential growth effect for every time period in the set $\mathcal{T}$. The dates in $\mathcal{T}^{post}$ are post-treatment, while those in $\mathcal{T}^{pre}$ are just before treatment, thus their inclusion will be our check for pre-existing trends.

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Table 4
Country Level Impact of French Revolution: Urbanization

| Dependent variable: Urbanization (Percent living in cities above 5000 inh.) | | | |
| | FE OLS | FE OLS | FE OLS | Weighted |
	(1)	(2)	(3)	(4)
French Revolution	-0.161	-2.625	-1.026	-0.235
x 1750 year dummy	[0.091]	[1.292]	[2.121]	[0.090]
French Revolution	-0.189	-4.832	-0.969	-0.200
x 1800 year dummy	[0.116]	[1.520]	[2.179]	[0.169]
French Revolution	-0.236	-3.835	-2.145	-0.289
x 1850 year dummy	[0.154]	[2.385]	[2.218]	[0.207]
French Revolution	0.899	9.521	13.081	0.662
x 1900 year dummy	[0.382]	[6.154]	[5.162]	[0.513]
p-value for joint significance	0.001	0.037	0.006	0.000
"French Revolution" after 1800				
	Years of	French Rev.	Napoleonic	Years of
Definition of treatment	French	Armies	Control	French
	Presence	Dummy	Dummy	Presence
Observations	202	202	202	202
Countries	41	41	41	41
R-squared	0.87	0.86	0.88	0.85

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Table 5
Country Level Impact of French Revolution: Urbanization

Dependent variable: Urbanization (Percent living in cities above 5000 inh.)					
	FE OLS	FE OLS	FE OLS	FE OLS	FE OLS
	(1)	(2)	(3)	(4)	(5)
French Revolution x 1750 year dummy	-0.161	-0.158	-0.161	-0.136	-0.129
	[0.091]	[0.096]	[0.091]	[0.105]	[0.104]
French Revolution x 1800 year dummy	-0.189	-0.203	-0.197	-0.194	-0.153
	[0.116]	[0.115]	[0.120]	[0.115]	[0.120]
French Revolution x 1850 year dummy	-0.236	-0.234	-0.214	-0.192	-0.143
	[0.154]	[0.155]	[0.163]	[0.153]	[0.161]
French Revolution x 1900 year dummy	0.899	0.914	0.847	1.137	1.169
	[0.382]	[0.394]	[0.396]	[0.422]	[0.400]
p-value for joint significance "French Revolution" after 1800	0.001	0.001	0.002	0.001	0.001
p-value for joint significance of "latitude" interactions		0.064			0.332
p-value for joint significance of "initial urbanization" interactions			0.359		0.563
p-value for joint significance of "protestantism" interactions				0.055	0.114
Definition of treatment	Years of French Presence	Years of French Presence	Years of French Presence	Years of French Presence	Years of French Presence
Observations	202	202	202	202	202
Countries	41	41	41	41	41
R-squared	0.87	0.88	0.88	0.88	0.89

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Table 6
Country Level Impact of French Revolution: Urbanization

Dependent variable: Urbanization (Percent living in cities above 5000 inh.)				
	FE OLS	FE OLS	FE OLS	A.-Bond GMM
	(2)	(3)	(4)	(5)
French Revolution	-0.152	-0.192	-0.345	
x 1750 year dummy	[0.092]	[0.089]	[0.091]	
French Revolution	-0.159	-0.133	-0.353	0.838
x 1800 year dummy	[0.113]	[0.118]	[0.140]	[0.69]
French Revolution	-0.179	-0.157	-0.31	-0.100
x 1850 year dummy	[0.144]	[0.148]	[0.094]	[0.43]
French Revolution	1.001	0.742	0.283	1.057
x 1900 year dummy	[0.374]	[0.383]	[0.227]	[0.38]
Lagged dependent variable				0.511
				[1.00]
p-value for joint significance "French Revolution" after 1800	0.001	0.014	0.004	0.000
Definition of treatment	Years of French Presence	Years of French Presence	Years of French Presence	Years of French Presence
Excluding the UK	Y	Y	Y	N
Excluding Eastern Europe	N	Y	N	N
Excluding Italy and Germany	N	N	Y	N
Observations	197	152	99	120
Countries	40	31	20	41
R-squared	0.88	0.9	0.85	

Cross-Country Evidence–Urbanization

- ▶ Tables 1 and 2 show the basic urbanization results.
- ▶ The effect is negative and mostly insignificant in 1850 $\alpha_{1850} = -0.236$ (s.e. 0.154), but significant by 1900: $\alpha_{1900} = 0.899$ (s.e. 0.382) .
- ▶ This means that for every year of French presence you get 0.899 % points more urbanization in 1900 compared to an untreated country. If the French stayed for 20 years, like in Belgium or the Rhineland, this translates into 18% points more. This is a large effect (about one s.d. in 1900).
- ▶ Negative or insignificant result in 1850 could be due, if our hypothesis is right, to downward bias due to Bairoch's inclusion criterion.
- ▶ Lots of robustness checks.

Cross-Country Evidence - GDP per-capita

- ► Table 7 uses Maddison data on GDP per capita.
  - ► Same regression setup as before
  - ► Fewer observations because we do not have data for states within Italy and Germany.

- ► Here we find largest quantitative effects in 1870. Though individual coefficients are often not significant the set of interactions between post-treatment time dummies and treatment variable is always jointly significant.

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Table 7
Country Level Impact of French Revolution: GDP per capita

	Dependent variable: log GDP per capita				
	FE OLS	FE OLS	FE OLS	FE OLS	FE OLS
	(1)	(4)	(5)	(6)	(7)
French Revolution	0.122	0.095	0.131	0.122	0.135
x 1700 year dummy	[0.102]	[0.099]	[0.103]	[0.112]	[0.105]
French Revolution	0.042	0.008	0.057	0.031	0.028
x 1820 year dummy	[0.049]	[0.062]	[0.048]	[0.051]	[0.050]
French Revolution	0.088	0.05	0.108	0.097	0.074
x 1850 year dummy	[0.043]	[0.064]	[0.038]	[0.045]	[0.078]
French Revolution	0.164	0.118	0.191	0.169	0.134
x 1870 year dummy	[0.042]	[0.073]	[0.031]	[0.038]	[0.087]
French Revolution	0.152	0.093	0.179	0.164	0.136
x 1890 year dummy	[0.047]	[0.084]	[0.039]	[0.048]	[0.109]
French Revolution	0.116	0.054	0.141	0.114	0.1
x 1900 year dummy	[0.054]	[0.090]	[0.049]	[0.058]	[0.121]
p-value for joint significance of post-1820 treatment interactions	0.000	0.000	0.000	0.000	0.028
Definition of treatment	Years of French Presence	Years of French Presence	Years of French Presence	Years of French Presence	Years of French Presence
Excluding Italy and Germany	Y	N	Y	Y	Y
Excluding the UK	N	N	Y	Y	N
Excluding Eastern Europe	N	N	N	Y	N
Incl. latitude, protestant, initial GDP	N	N	N	N	Y
Observations	158	174	150	96	158
Countries	0.96	0.95	0.97	0.96	0.97
R-squared	20	22	19	12	20

Within-Germany Evidence

► We now exploit the variation within Germany. Interesting because we can focus on more comparable treatment and control groups, but also because we can build an index of reforms.

► Also important because we can take into account the effects of defensive modernization (Prussia, Bavaria...) and the fact that after the Congress of Vienna reforms were often reversed in places where previous rulers returned. Defensive modernization may be biasing estimates downwards, conservative 'reaction' may be biasing them up.

► We use the same three treatments as before and use them as our instrument for institutional reforms.

► Basic results very consistent with cross-country evidence.

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Table 8
Within-Germany Impact of French Revolution: Urbanization in 8 regions

Dependent variable: Urbanization (Percent living in cities above 5000 inh.)					
	FE OLS	FE OLS	FE OLS	FE OLS W of Elbe	A.-Bond GMM
	(1)	(2)	(3)	(4)	(9)
French Revolution	-0.192	-3.115	1.77	-0.167	
x 1750 year dummy	[0.14]	[2.21]	[5.65]	[0.17]	
French Revolution	0.008	-0.773	4.826	0.02	0.195
x 1800 year dummy	[0.15]	[2.37]	[4.69]	[0.18]	[0.18]
French Revolution	0.187	3.807	4.664	0.21	0.333
x 1850 year dummy	[0.15]	[2.26]	[4.60]	[0.18]	[0.14]
French Revolution	0.712	12.52	9.745	0.774	
x 1875 year dummy	[0.20]	[3.06]	[4.83]	[0.25]	
...					
French Revolution	0.988	14.56	14.01	1.044	1.098
x 1900 year dummy	[0.37]	[5.41]	[6.45]	[0.46]	[0.59]
...					
French Revolution	1.075	14.92	15.72	1.168	
x 1910 year dummy	[0.37]	[5.39]	[6.23]	[0.43]	
Lagged dependent variable					0.201
					[1.42]
p-value for joint significance	0.000	0.000	0.036	0.000	0.059
"French Revolution" after 1800					
Definition of treatment	Years of French Presence	French Rev. Armies Dummy	Napoleonic Control Dummy	Years of French Presence	
Observations	94	94	94	82	22
Countries	8	8	8	7	8
R-squared	0.96	0.95	0.95	0.95	

Reduced Form Results

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- ▶ Same setup as before
- ▶ General pattern is that parts of Germany treated by the French grow significantly faster by 1875.
- ▶ Quantitative effects similar to the cross-country findings.
- ▶ No evidence of a pre-trend and treated places start poorer and overtake untreated places.

Measuring Reforms in Germany

- To develop a structural model we coded the various reforms that the French implemented in Germany.
  - abolition of the guilds
  - agrarian reforms
  - introduction of the civil code
  - emancipation of Jews

- We coded each with a 0 (no reform) or 1 (reform) and constructed an index R_{it} based on how many years the reforms had been in place by year t:

$$R_{jt} = \frac{1}{4} \sum_{r \in \mathcal{R}} (t - t_{rj}^o)$$

- where t_{rj}^o is the date of introduction of reform r in state j.

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Table 2
Reforms

| | Treatment definitions: | | | |
	French Rev. Armies	Napoleonic Armies	Years French Control	...
Hanover	0	1	3	
Prussia (Eastern part)	0	0	0	
Prussia, Rhine Province	1	1	19	
Prussia, Westphalia	0	1	6	
Saxony	0	0	0	
Baden	0	0	0	
Württemberg	0	0	0	
Bavaria	0	0	0	

Invaded by FRA, average:
Not invaded by FRA, average:

Invaded by Nap., average:
Not invaded by Nap., average:

Years of Fr. presence, corr:

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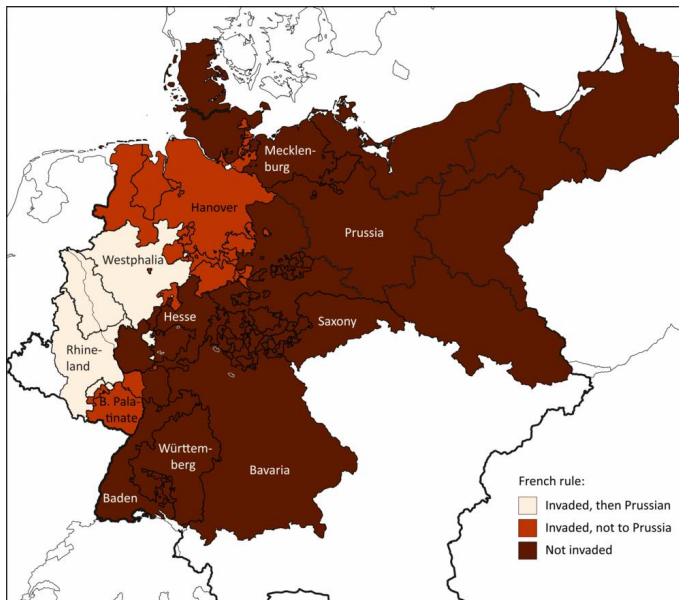Simon Johnson,
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Table 2
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	Civil Code	Ag. Reform	Outcomes: Abol. Guilds	Eman. Jews	Ref. Ind. 1850	Ref. Ind. 1900
Hanover	1900	1831	1869	1848	4.75	25
Prussia (Eastern part)	1794	1821	1810	1869	31.25	68.75
Prussia, Rhine Province	1805	1811	1800	1869	33.5	71
Prussia, Westphalia	1808	1825	1808	1869	27.25	64.75
Saxony	1863	1832	1862	1849	4.5	35.75
Baden	1810	1785	1862	1862	26.25	60.75
Württemberg	1900	1836	1862	1864	3.5	25.5
Bavaria	1900	1826	1868	1868	6	26.5
Invaded by FRA, average:	1805	1811	1800	1869	33.5	71
Not invaded by FRA, average:	1854	1822	1849	1861	14.79	43.86
Invaded by Nap., average:	1838	1822	1826	1862	21.83	53.58
Not invaded by Nap., average:	1853	1820	1853	1862	14.3	43.45
Years of Fr. presence, corr:	-0.3978	-0.1740	-0.6610	0.3057	0.5341	0.5054

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Figure 1: Reforms index, Germany

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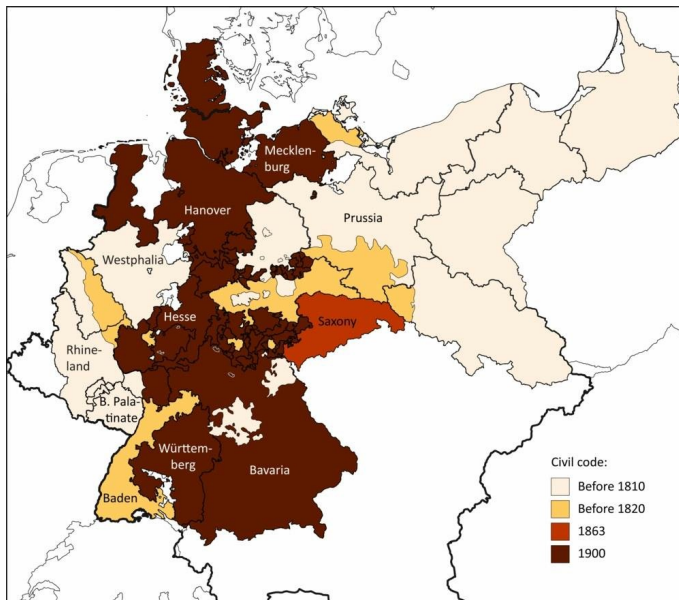Simon Johnson,
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Econometric Model: IV

- First stage

$$R_{jt} = d_t + \delta_j + \psi \cdot t \cdot T_{t>1800} \cdot I_j + \eta_{jt}$$

- Where t is a linear time trend, which is interacted with the treatment indicator I_i, and $T_{t>1800}$ is a dummy for post-1800 dates,

- Alternatively, we can run a use a full set of treatment*year dummies as instruments

- Second stage

$$y_{jt} = d_t + \delta_j + \phi \cdot R_{jt} + v_{jt}$$

The
Consequences of
Radical Reform:
The French
Revolution as a
Natural
Experiment

Daron Acemoglu,
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Introduction

Preview of Results

Historical
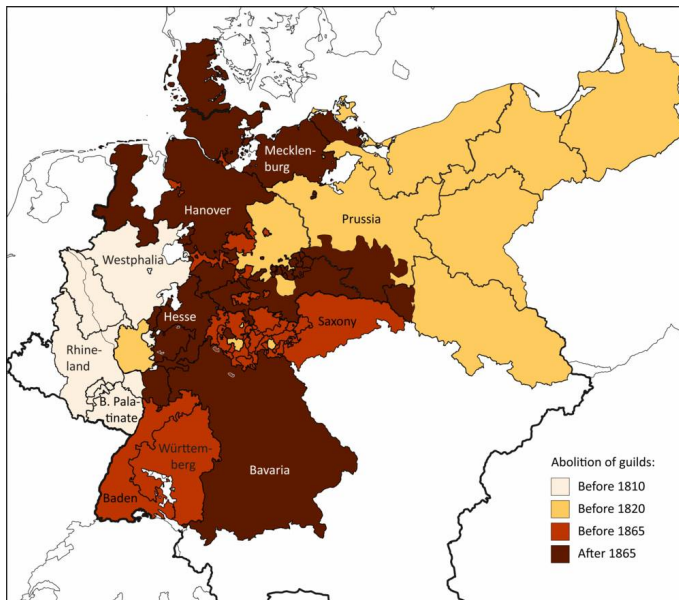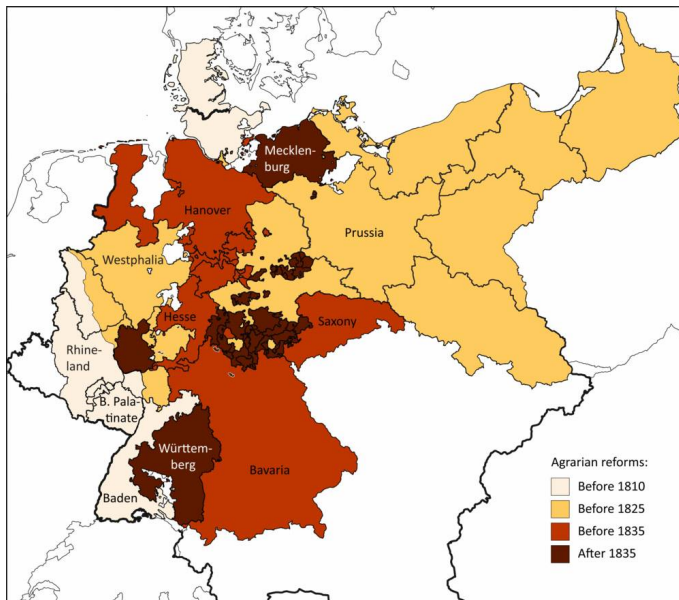background

Cross-country
evidence

Within-Germany
Evidence

Reforms in
Germany

Conclusion

Table 9
Within-Germany Impact of French Revolution: Urbanization in 8 regions

Dependent variable: Urbanization (Percent living in cities above 5000 inh.)				
	FE	FE	FE, overid	FE, overid
		W of Elbe		W of Elbe
	(1)	(2)	(3)	(4)
Panel A: OLS estimation				
Reforms Index	0.368	0.419	0.368	0.419
	[0.13]	[0.15]	[0.13]	[0.15]
Panel B: First stage				
Years of French Presence	0.711	0.878		
× post-1800 dummy × time trend	[0.25]	[0.24]		
Panel C: 2SLS estimation				
Reforms Index	0.658	0.575	0.693	0.608
	[0.21]	[0.17]	[0.21]	[0.18]
p-value overidentification test			0.529	0.428
Number of Countries	8	7	8	7
Number of Observations	94	82	94	82

IV Results

- ▶ Table 9 shows the results of the IV regressions.

- ▶ Panel A shows the OLS regression of urbanization on the reform index. Coefficient on reforms is positive and highly significant.

- ▶ Panel B shows there is a strong first-stage relationship between the treatment variable (here years of French presence) and the reform index.

- ▶ In the second stage reforms have a positive and significant effect on urbanization coefficient is 0.658. The reforms table shows that a well reforming country had an index of about 60 by 1900, which implies that it had $0.658 \times 60 = 39.4\%$ points more urbanization. Similar to the cross-country numbers.

- ▶ Final two columns show similar results with the overid strategy.

Conclusions

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- ▶ Evidence that places which were exogenously reformed by the French during the Napoleonic period did relatively better subsequently.

- ▶ Consistent with the view that the institutions of the *ancien régime* (guilds, feudal legacy in countryside, absence of equality before the law) impeded growth.

- ▶ Not consistent with the view that civil code detrimental economically (though comparison is not to Common Law).

- ▶ Not consistent with the view that institutions have to be appropriate or evolve organically.

- ▶ Why did it work when reforms often fail? Most likely because there was simultaneous reform in many dimensions and local elites did not have sufficient power to undermine them.