Ancestry and Economic Development: Facts and Questions

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Summary

- **Facts**: empirical relations between ancestral composition of current populations and aggregate socioeconomic outcomes (economic development, adoption of technological innovations)
- **Questions**: Why does ancestry matter? Possible mechanisms
- **An example**. The spread of the Industrial Revolution and the decline of marital fertility in Europe: a tale of two diffusions?

References

(joint with Romain Wacziarg, UCLA)

- **The Diffusion of Development**, *Quarterly Journal of Economics*, May 2009
- **How Deep Are the Roots of Economic Development?** *Journal of Economic Literature*, June 2013
- **Long-Term Barriers to Economic Development**, in *Handbook of Economic Growth, vol. 3,* edited by P. Aghion and S. Durlauf, North Holland – Elsevier

Long-term persistence holds at the level of populations rather than locations

- A focus on populations rather than locations helps us understand both persistence and reversal of fortune, and sheds light on the spread of economic development.
- Current economic development is correlated with historical characteristics of a population's ancestors, including ancestors' years of experience with agriculture, going back to the Neolithic transition.

Table 6 from Spolaore and Wacziarg (JEL, 2013)
Dependent variable: log per-capita income, 2005

	(1)	(2)	(3)	(4)	(5)
Main regressor:	**Share of Europeans**	**Sample with less than 30% of Europeans**	**Control for ancestry-adjusted years of agriculture**	**Control for ancestry-adjusted state history**	**Control for genetic distance to USA weighted**
Share of descendants of Europeans	1.058 (4.743)***	2.892 (3.506)***	1.079 (4.782)***	1.108 (5.519)***	0.863 (3.601)***
Ancestry-adjusted years of agriculture, in thousands			0.105 (2.696)***		
Ancestry-adjusted state history				1.089 (3.108)***	
Fst genetic distance to USA Weighted					-4.576 (2.341)**
Constant	8.064 (24.338)***	7.853 (17.030)***	7.676 (21.984)***	7.195 (21.594)***	8.637 (20.941)***
Observations	150	92	147	134	149
R-squared	0.526	0.340	0.580	0.656	0.545

Why Does Ancestry Matter? Mechanisms

- Intergenerational transmission can take place through **different inheritance systems**: **biological**, **cultural, dual** (gene-culture interaction)
- The effects of inherited traits on productivity, fertility and other economic outcomes may be **direct** or operate as **barriers** to the transmission of innovations (new technologies, novel behaviors and values)

A Taxonomy

Mechanism of impact / Type of transmission	Direct Effect	Barrier Effect
Biological (genetic or epigenetic)	e.g. Galor-Moav (2002), Clark (2007)	e.g., Spolaore and Wacziarg (2009, 2012, 2013)
Cultural (behavioral or symbolic)	e.g. Max Weber and many others (Bisin-Verdier, Tabellini, Alesina-Giuliano, ..)	
Dual (gene-culture interaction)	e.g., Boyd and Richerson	

Table 7 (JEL) – Genetic Distance and Economic Development, Cross-Sectional Regressions (dependent variable: log per capita income, 2005)

	(1)	(2)	(3)
Main regressor:	**Indigenous genetic distance**	**Ancestry-adjusted genetic distance**	**Control for the share of Europeans**
FST genetic distance to the USA, 1500 match	**-4.038**		
	(3.846)* **		
FST genetic distance to the USA, weighted, current match		**-6.440**	**-4.576**
		(3.392)* **	**(2.341)** **
Absolute latitude	0.034	0.030	0.015
	(5.068)***	(4.216)***	(1.838)*
% land area in the tropics	-0.182	-0.041	-0.384
	(0.582)	(0.135)	(1.189)
Landlocked dummy	-0.637	-0.537	-0.521
	(3.686)***	(2.971)***	(3.051)***
Island dummy	0.584	0.607	0.557
	(2.389)**	(2.392)**	(2.262)**
Share of descendants of Europeans, per Putterman and Weil			0.863
			(3.601)***
Constant	8.451	8.618	8.637
	(23.577)***	(21.563)***	(20.941)***
Beta coefficients on the bold variable	-23.85%	-27.11%	-20.30%
Observations	155	154	149
R-squared	0.499	0.496	0.545

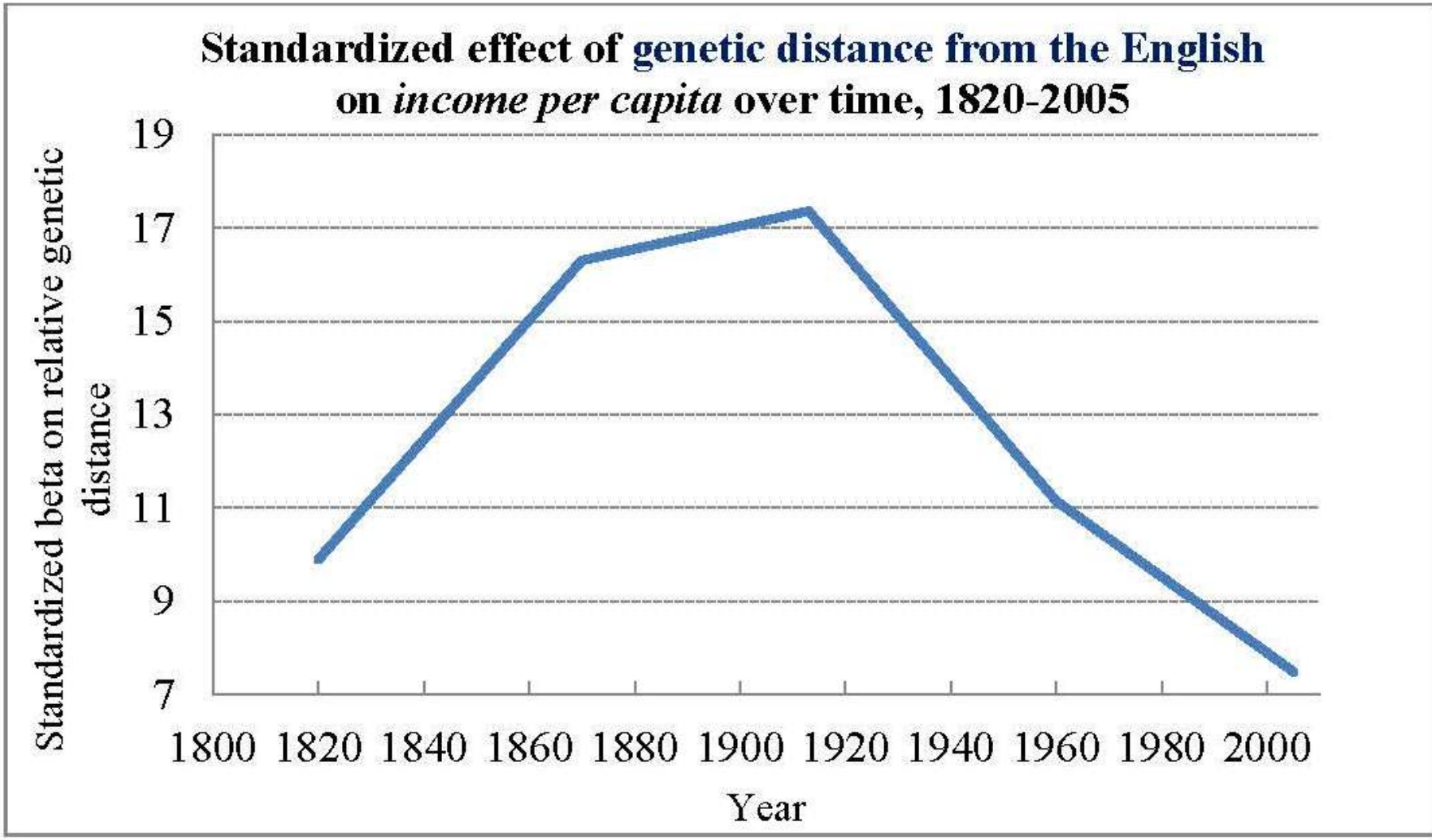
The Diffusion of the Industrial Revolution

(from Spolaore and Wacziarg, in Handbook of Economic Growth)

	(1)	(2)	(3)	(4)	(5)
	Income 1820	**Income 1870**	**Income 1913**	**Income 1960**	**Income 2005**
Fst genetic distance to the English	0.671 (0.344)*	1.691 (0.836)**	1.984 (0.907)**	3.472 (0.783)**	5.075 (0.941)**
Constant	0.313 (0.063)**	0.365 (0.076)**	0.421 (0.064)**	0.478 (0.077)**	1.017 (0.088)**
Observations	1,035	1,485	1,653	4,753	10,440
Standardized beta (%), maximal sample	8.75	15.02	15.02	28.82	30.58
Standardized beta, restricted sample*	9.89	16.30	17.36	11.15	7.49
R-Squared	0.22	0.16	0.17	0.17	0.11

Two-way clustered standard errors in parentheses; * significant at 10%; ** significant at 5%; ** significant at 1%
In all regressions, controls are included for: Absolute difference in latitudes, absolute difference in longitudes, geodesic distance, dummy for contiguity, dummy if either country is an island, dummy if either country is landlocked, dummy if pair shares at least one sea or ocean.
Population density data for 1500 are from McEvedy and Jones (1978). Income data for 1820, 1870 and 1913 are from Maddison (1994). Income data for 1960 and 2005 are from the Penn World Tables.

The Diffusion of the Industrial Revolution

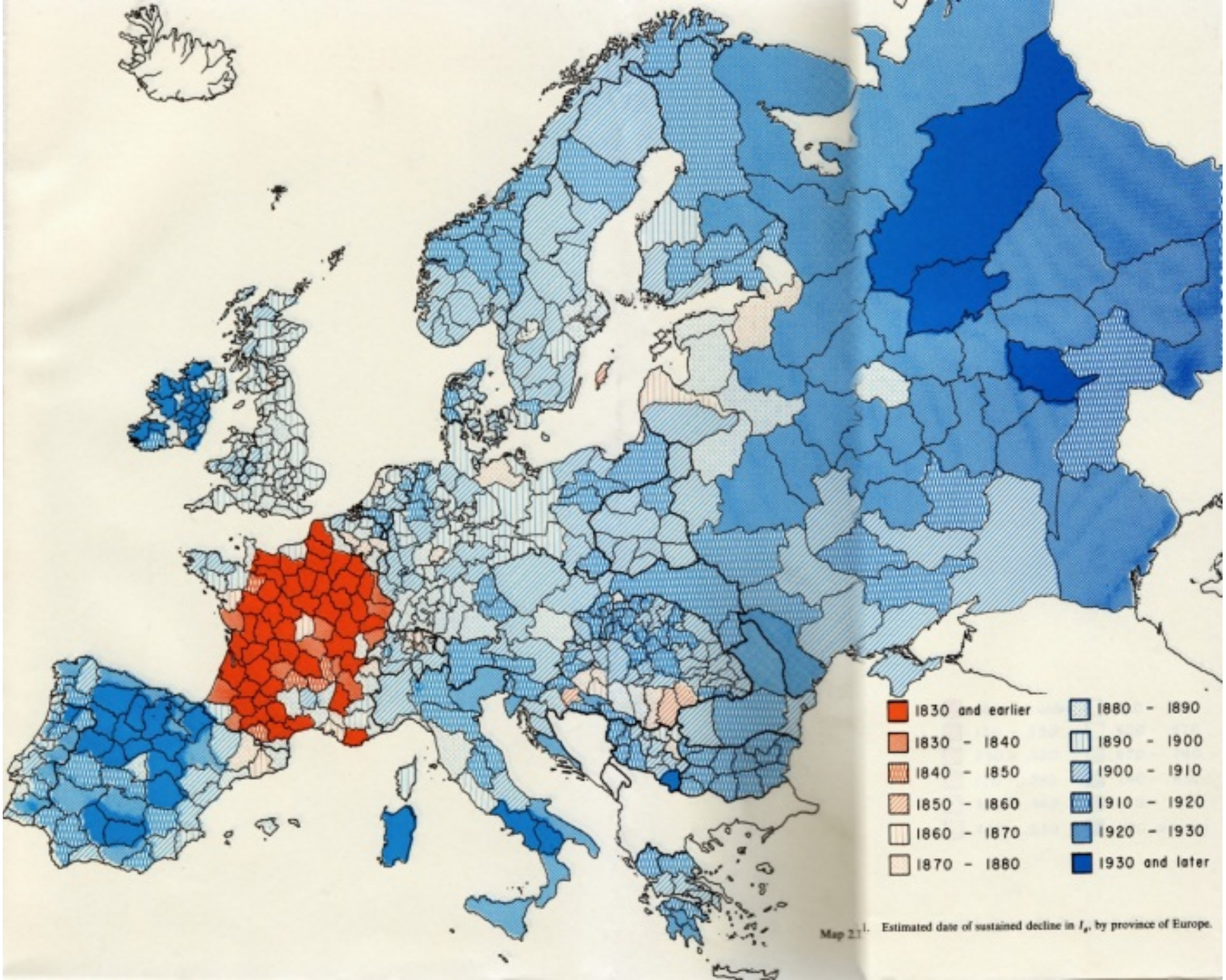


A Key Behavioral Innovation: Reduced Marital Fertility

- Fertility decline is not a new phenomenon historically, but in pre-modern times it tended to take place through marriage postponement and/or reduction of fertility outside marriage.
- It is only in modern times that most people started to significantly *reduce* their overall fertility **within marriage** (e.g., studies in Coale and Cotts Watkins, 1986 – *Princeton European Fertility Project*).

Dates of the fertility transition in selected European populations

Country or Region	Date	Country or Region	Date
France	1827	Austria	1907
Latvia	1865	Hungary	1910
Catalonia	1875	Ukraine	1910
Walloon Belgium	1875	Finland	1912
Switzerland	1887	Poland	1912
Germany	1888	Greece	1913
England	1892	Italy	1913
Scotland	1894	Lapland	1915
Freisland	1897	Slovakia	1915
Netherlands	1897	Portugal	1916
Denmark	1898	Spain	1920
Sweden	1902	Ireland	1922
Norway	1903	Russia	1922
Czech Republic	1905	Belarus	1925
Flemish Belgium	1905	Basque Country	1930
Lithuania	1905	Iceland	1930
Wales	1905	Sardinia	1961



Map 2.1. Estimated date of sustained decline in I_g, by province of Europe.

A Tale of Two Diffusions?

Hypothesis 1: *The spread of "modernity" involved two separate processes of diffusion*

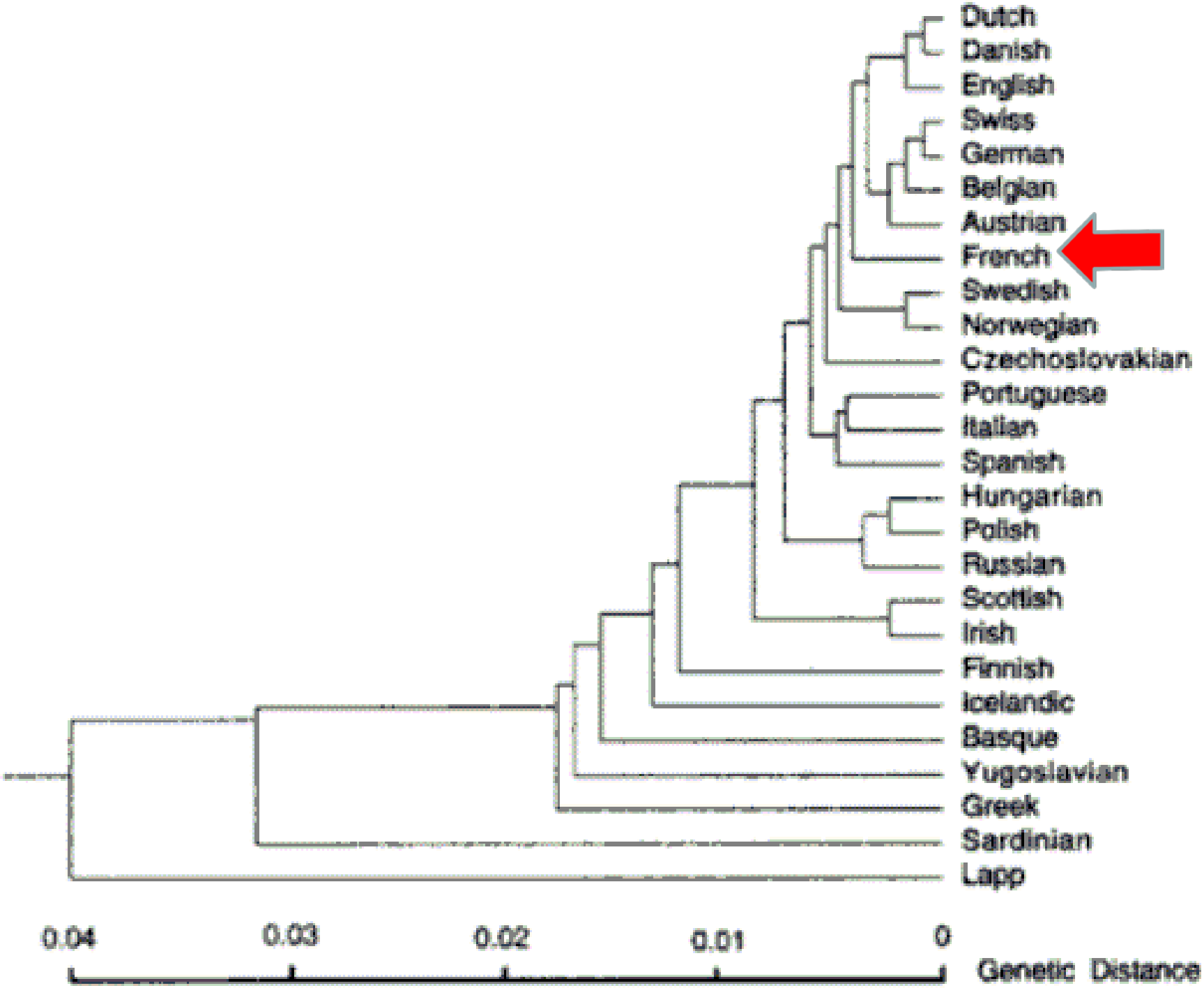
-) The spread of **technological innovations** associated with the **Industrial Revolution**, where **England** played a leading role

-) The spread of **social/behavioral changes** – such as **marital fertility decline** - where **France** played a leading role

Hypothesis 2: *The two diffusions followed different patterns, because societies at different relative "ancestral" distances from the innovators faced different barriers to imitation*

-) Societies that were relatively "closer" to **England** faced lower barriers to adopting the innovations associated with the Industrial Revolution (Spolaore and Wacziarg, 2009, 2012, 2013a, 2013b)

-) Societies that were "closer" to **France** were more likely to adopt the social/behavioral changes pioneered by the French – such as lower marital fertility.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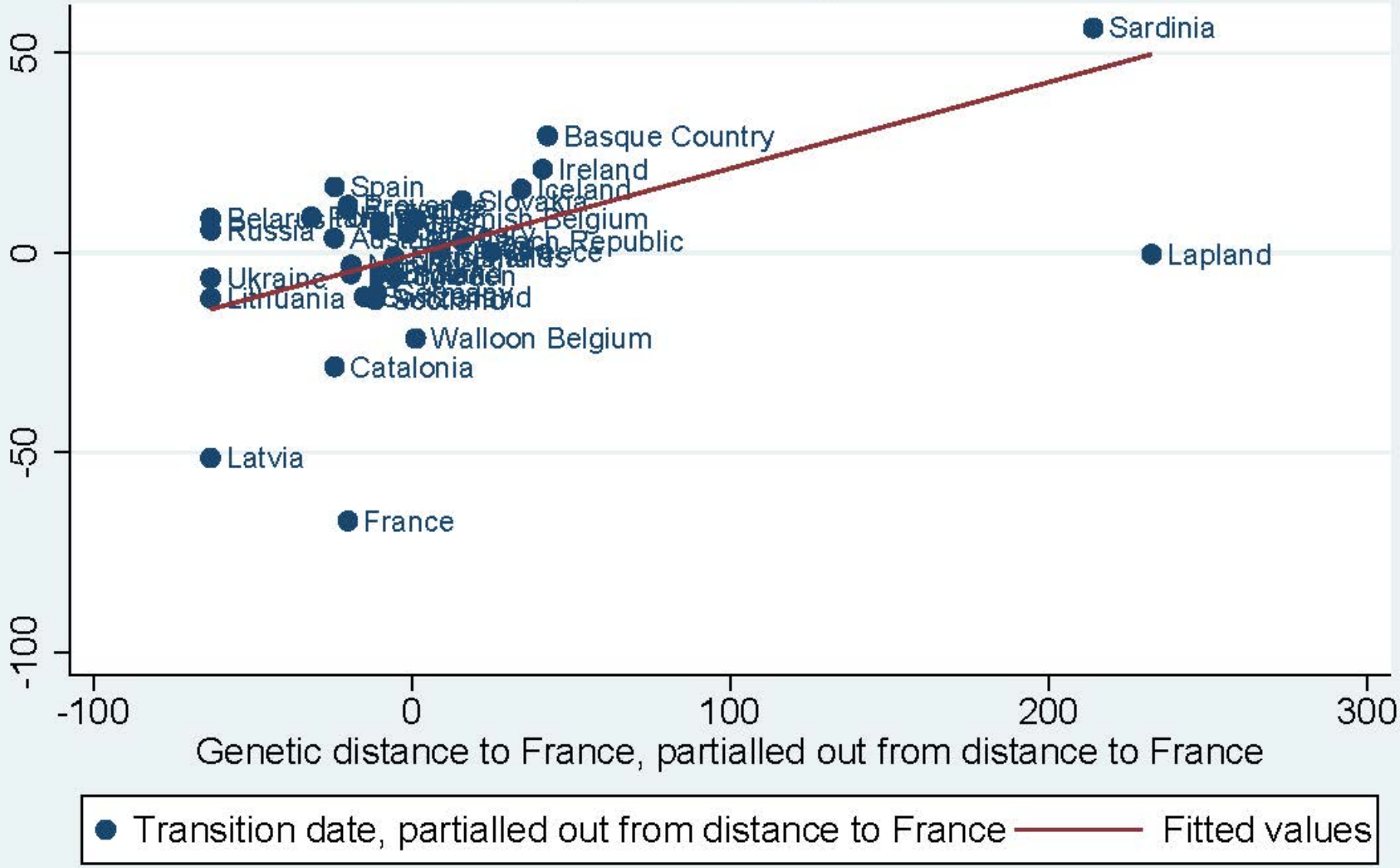
Genetic Distance

Marital Fertility Decline in Europe

Cross-national regressions for the transition date, focusing on genetic distance from France

	Univariate	Control for distance	Control for geography	Control for initial income 1820
F_{ST}	**0.163**	**0.146**	**0.172**	**0.169**
from France	(3.54)***	(2.78)***	(2.45)**	(2.00)*
Geodesic Distance to		2.912	1.502	-13.592
France		(0.64)	(0.11)	(0.49)
Absolute difference in			-102.774	-58.838
latitudes, from France			(0.90)	(0.39)
Absolute difference in			16.311	167.189
longitudes, from France			(0.61)	(0.63)
1 for contiguity with			-11.448	-9.273
France			(1.11)	(0.59)
=1 if an island			2.140	2.412
			(0.13)	(0.08)
=1 if shares at least one			12.621	24.613
sea or ocean with France			(1.19)	(1.39)
Average elevation between			31.605	41.252
countries to France			(1.26)	(1.34)
Per capita income, 1820,				-0.001
from Maddison				(0.02)
Constant	1,893.536	1,891.221	1,881.119	1,865.035
	(426.44)***	(328.75)***	(143.30)***	(38.24)***
# of nations	36	36	36	26

Figure 2 - Genetic Distance to France and the Fertility Transition, controlling for distance



Horserace France vs. England
(Dependent variable: Fertility Transition date)

	Univariate	Control for distance	Horserace, simple	Horserace, all geo. controls	Horserace, all controls + income 1820
FST	**0.163**	**0.044**	**-0.131**	**-0.236**	**-0.344**
from England	**(1.77)***	**(0.30)**	**(0.89)**	**(1.14)**	**(1.05)**
FST			**0.177**	**0.225**	**0.211**
from France			**(3.01)*** **	**(2.77)** **	**(1.87)* **
Geodesic Distance		7.488	18.444	94.460	67.167
from England		(1.01)	(1.27)	(2.01)*	(0.77)
Geodesic Distance			-10.546	-73.446	-76.655
from France			(0.81)	(1.53)	(1.13)
Per capita income, 1820,					-0.008
from Maddison					(0.14)
Constant	1,896.270	1,893.332	1,889.430	1,885.589	1,890.393
	(323.18)***	(289.02)***	(311.11)***	(82.78)***	(15.86)***
# of countries	36	36	36	36	26

Linguistic Distance

Linguistic Distance from Ethnologue (Gordon)

number of different linguistic nodes between language A and language B

Example:

Linguistic Distance between Paris and Madrid

Indo-European, Italic, Romance, Italo-Western, Western, Gallo-Iberian, **Gallo-Romance, Gallo-Rhaetian, Français (Langue d'Oïl)**

Indo-European, Italic, Romance, Italo-Western, Western, Gallo-Iberian, **Ibero-Romance, West Iberian, Castilian**

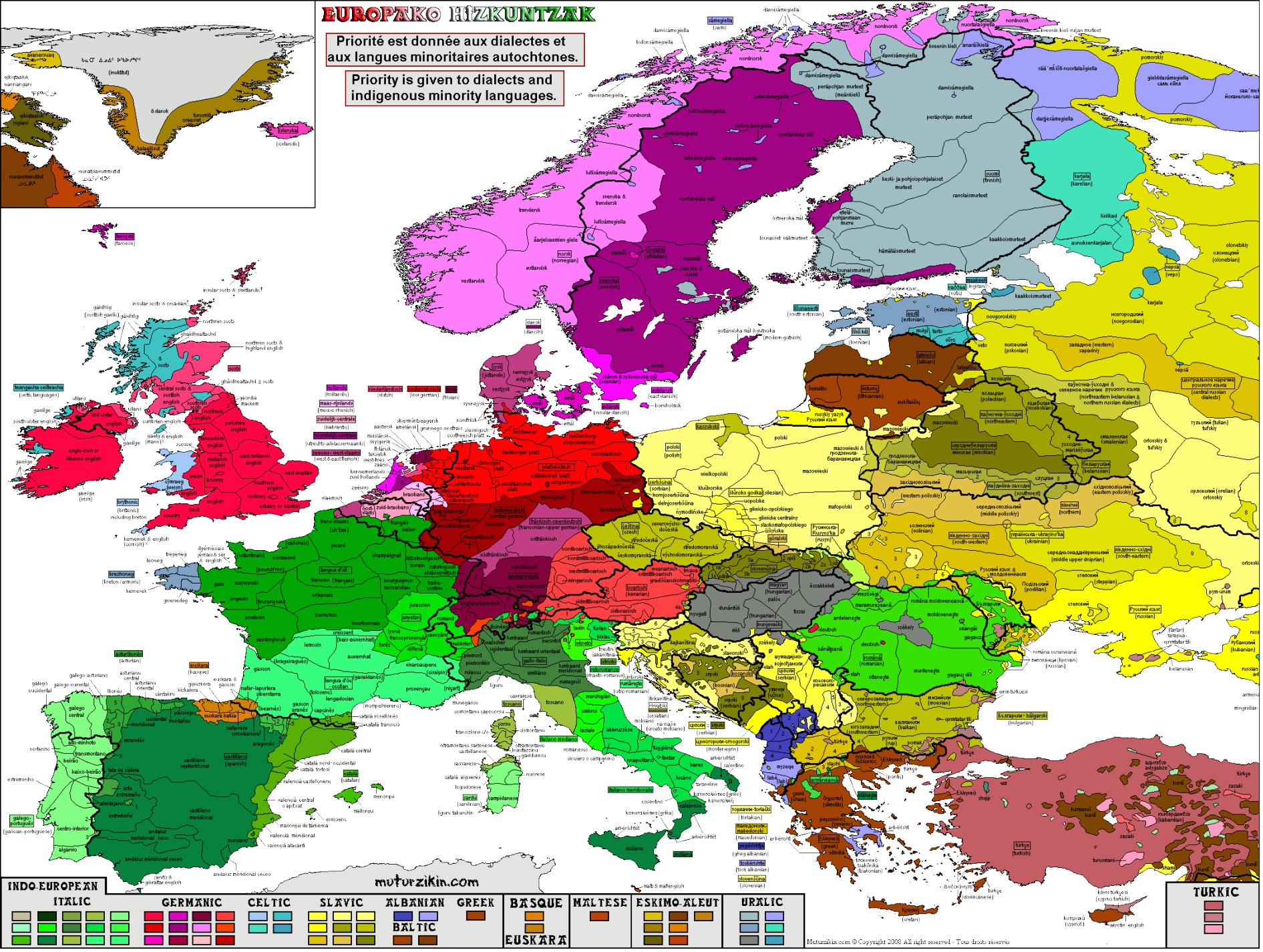

EUROPAKO HIZKUNTZAK
Priorité est donnée aux dialectes et aux langues minoritaires autochtones.
Priority is given to dialects and indigenous minority languages.
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Table 3 - Cross-Regional Regressions for the transition date
(Dependent variable: Fertility Transition Date)

	Univariate	Control for distance	Control for geography
# of different nodes with Français	**5.106**	**3.482**	**1.211**
	(18.23)***	**(13.54)*****	**(6.23)*****
Geodesic distance to Paris, km		0.019	0.009
		(16.75)***	(2.17)**
Absolute difference in longitudes, to Paris			0.279
			(1.04)
Absolute difference in latitudes, to Paris			-0.799
			(2.62)***
=1 if the region's country is contiguous with France			-25.391
			(17.93)***
Average elevation between countries to France			109.722
			(32.16)***
=1 if the region's country shares at least one sea or ocean with France			10.454
			(4.68)***
=1 if the region is in a landlocked country			-17.573
			(7.81)***
Constant	1,857.732	1,849.654	1,848.408
	(833.14)***	(945.87)***	(611.20)***
# of regions	729	729	696

(t-statistics in parentheses; * p<0.1; ** p<0.05; *** p<0.01)

Table 4 - Cross-Regional Regressions, English-French Horserace
(Dependent variable: Fertility Transition Date)

	Univariate	Control for distance	Horserace I	Control for geography
# of different nodes with English	**0.270** **(0.32)**	**-9.842** **(12.22)*** **	**-1.256** **(1.26)**	**1.105** **(1.76)***
# of different nodes with Français			**2.976** **(9.59)*** **	**1.417** **(6.25)*** **
Geodesic distance to London, km		0.029 (22.03)***	-0.007 (1.46)	
Geodesic distance to Paris, km			0.027 (5.94)***	0.007 (1.54)
Absolute difference in longitudes, to Paris				0.372 (1.37)
Absolute difference in latitudes, to Paris				-0.772 (2.53)**
=1 if the region's country is contiguous with France				-25.989 (17.87)***
Average elevation between countries to France				111.410 (31.48)***
=1 if the region's country shares at least one sea or ocean with France				11.504 (4.98)***
=1 if the region is in a landlocked country				-18.375 (8.01)***
Constant	1,894.576 (880.01)***	1,883.203 (1,078.62)***	1,854.896 (637.03)***	1,844.842 (507.58)***

In Conclusion

- Diffusion of fertility behavior and diffusion of economic development followed different patterns
- The spread of lower marital fertility in Europe is consistent with diffusion from France, with societies closer to the French facing lower initial barriers to the adoption of the novel behavior, even through eventually all European populations adopted the new behavior
- Barriers to diffusion seem to be in large part associated with differences in inter-generationally transmitted traits (relative genetic and ancestral linguistic distance)
- Big open question: what specific mechanisms?