Monetary Blocs, Optimum Currency Areas and European Monetary Integration:
Evidence from the Italian and German Unifications (1846-1870)

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Paper Overview

- What can we learn from past episodes of international and national monetary integration?
- Focus on the pre-1870 period: Gold Standard, Latin Union / Italy, Germany.

1) Monetary Blocs: Was the pre-1870 European monetary system unipolar? Was the Gold Standard inevitable?

2) Macroeconomic costs of monetary integration (focus of today)

- How big were the costs of monetary integration for Italy and Germany at unification? How close were they to an OCA?
- Are OCAs endogenous? Evidence on the Frankel and Rose vs. Krugman debate from the Italian unification.

Today

1) International Monetary Integration: Theory and Practice

2) Data

3) Econometric Analysis

4) Implication for OCA endogeneity hypothesis and Italian economic history

Costs and Benefits of Monetary Integration (1)

- Original OCA framework (Mundell, 1961)

1) **Benefits:** Reduction in transaction costs for trade and financial transactions. Trade effect literature (Rose, 2000; Tenreyro, 2007).

2) **Costs:** Loss of monetary policy independence, vulnerability to asymmetric shocks→ Depends on: trade integration, factor mobility, price flexibility or smoothing mechanisms (fiscal / banking union).

- Are the OCA "criteria" endogenous? Frankel and Rose (1998) vs. Krugman (2001)

Costs and Benefits of Monetary Integration (2)

- Alesina and Barro (2002): very few countries really enjoy an independent monetary policy.

- This implies additional benefits (credibility) and lower costs to international monetary integration, which mostly involves "anchor-client" relationships.

- "German dominance hypothesis": was pre-Maastricht Europe a Deutsche Mark zone (Giavazzi and Giovannini, 1998)?

Operationalizing the OCA Framework

- Symmetry of shocks between a given region and a potential anchor indicate low costs of monetary integration (Alesina, Barro, Tenreyro, 2002).

- An **OCA** can be proxied as an area composed of regions with **similar dominance with respect to the same anchor(s)**.

- Nominal FX movements as a proxy of synchronization following Bayoumi and Eichengreen (1997).

- Estimate of monetary dominance and FX movements synchronization through Frankel-Wei regressions.

Data

- Original database of twice-weekly foreign exchange bills quotes manually collected from The Economist from 1846 to 1869

- London quotes on 22 European financial centres: 102,930 bid-ask observations, 26,371 weekly quotes

- Reflecting nominal shocks across Europe both between and within countries

Volatility of Foreign Exchange Bills' Returns Quoted in London (1852-1858):
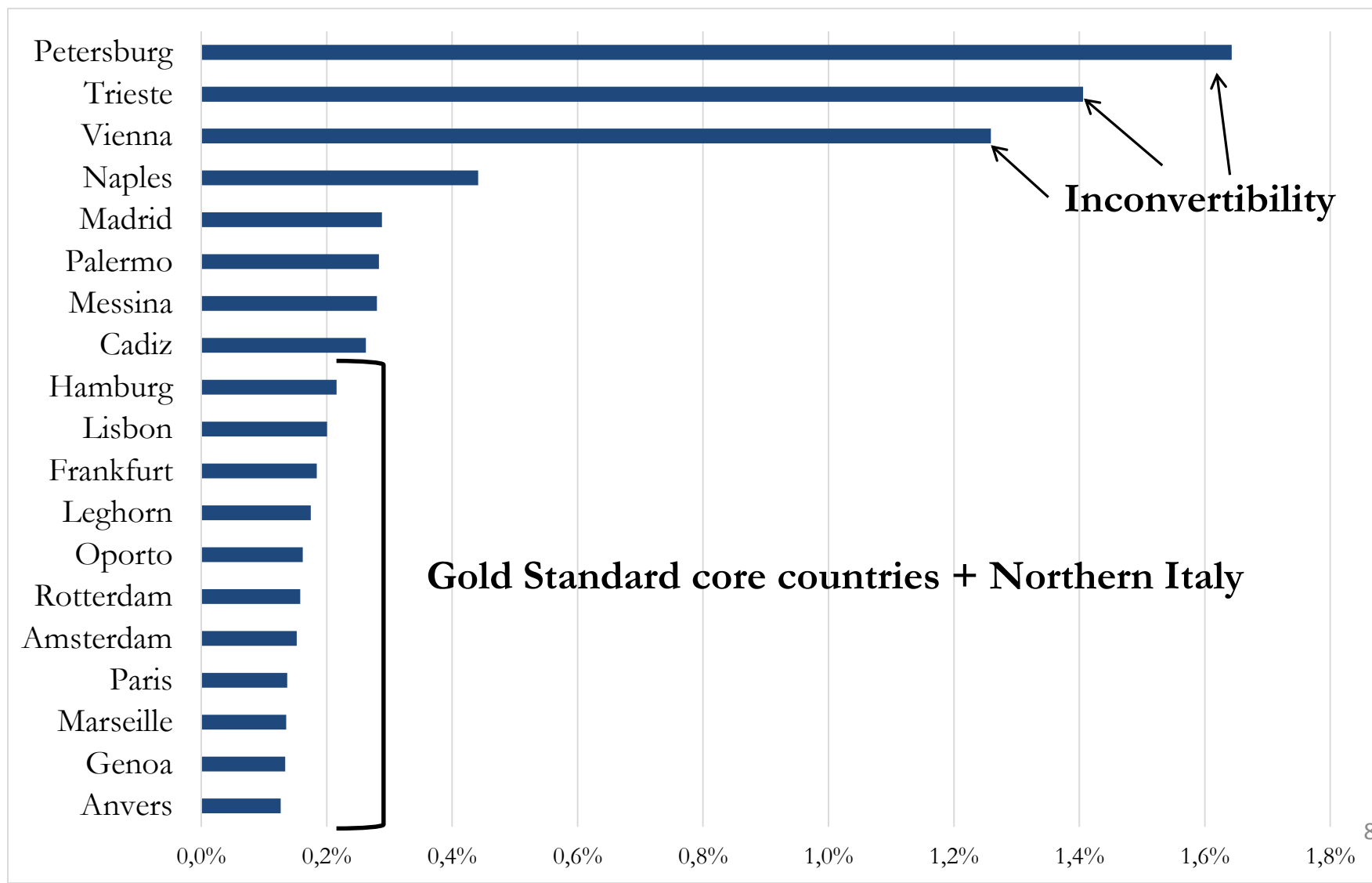
Foreign Exchange Bills' Returns Correlation Coefficient (1852-1858)

National monetary unions, **Confederations**, **"Potential" monetary unions**
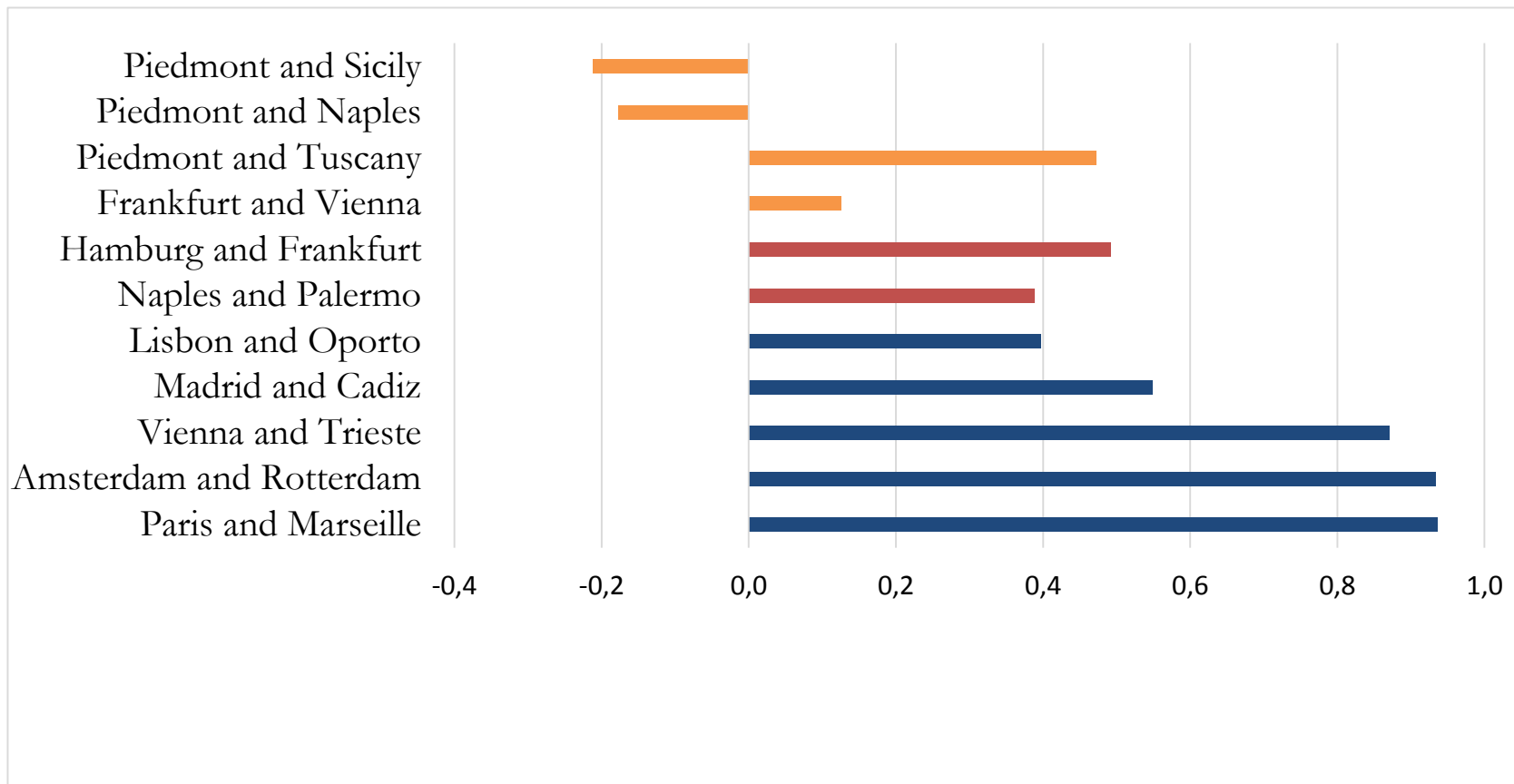
Average Intra-Monetary Zone Spread against the British Pound

	National Monetary Unions						Franc Germinal Zone****	
	Paris vs. Marseille	Vienna vs. Trieste	Madrid vs. Cadiz	Lisbon vs. Oporto	Palermo vs. Messina**	Genoa vs. Naples***	Paris vs. Anvers	Paris vs. Genoa
1846-52	0.17%	0.14%	1.61%	0.33%	0.31%	-	0.22%	1.41%
1852-58	0.05%	0.35%	0.75%	0.41%	0.20%	-	-0.31%	0.50%
1859-65	0.04%	0.08%	0.33%	0.27%	0.09%	0.05%	-0.13%	0.50%
1866-69	0.06%	0.05%	1.01%	0.05%	-0.03%	0.01%	0.19%	7.82%

The figures in the table represent the difference in the amount of British Pounds one could buy for one unit of local currency in two different centers of a monetary zone.
** *Quoted in Sicilian Once until 1863 when the Italian Lira takes over.*
*** *Calculated only from 1863 onward when both centers start to be quoted in Italian Lire.*
**** *Latin Monetary Union from 1865 onward. The Italian Lira becomes inconvertible in 1866.*

FX-Bills Returns Correlation

- Money markets integration at odds with findings by Toniolo et al. (2003) and Collet (2013)

- Likely the Italian Lira quotes in London reflected conditions in Northern markets as the currency did not circulate widely in the South until later in the century
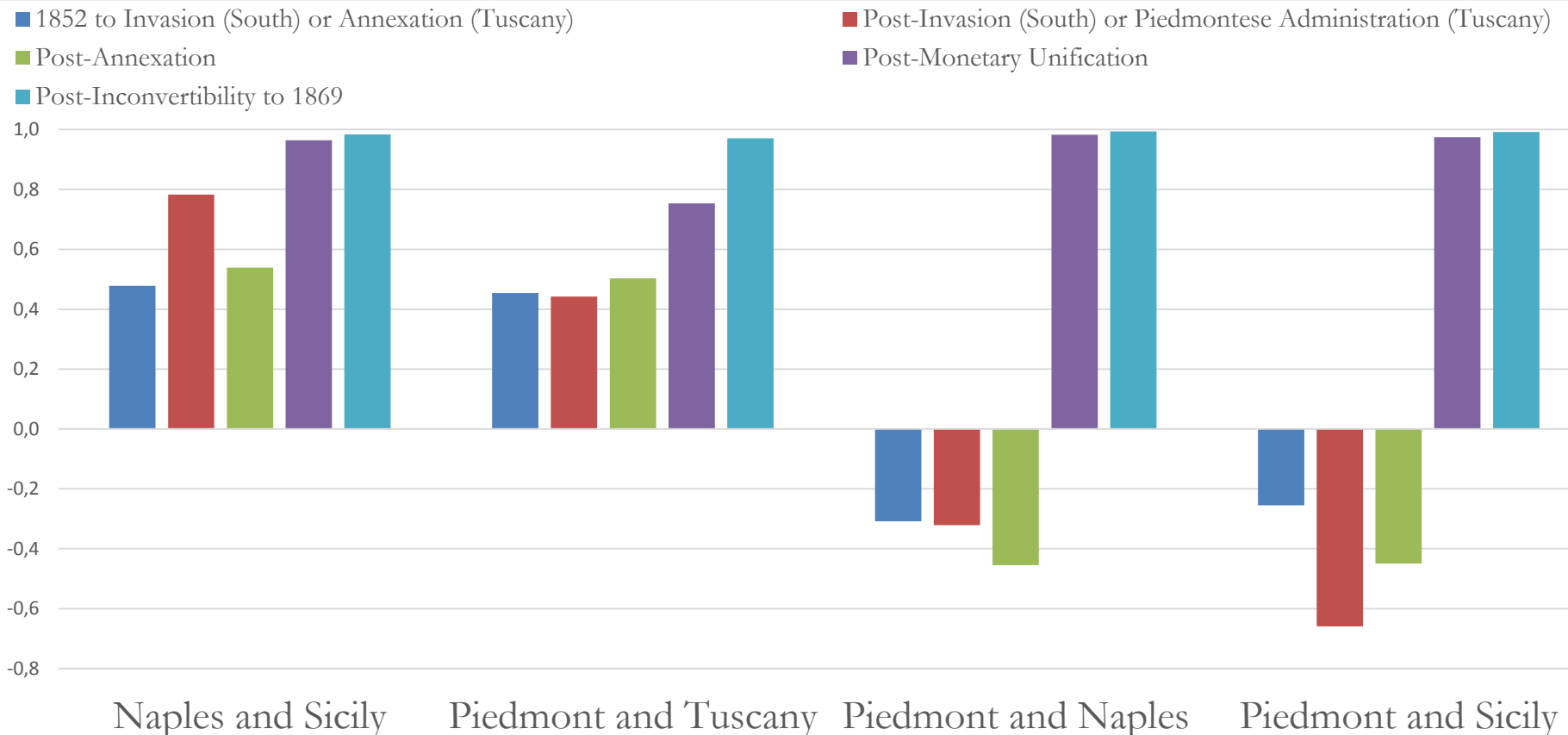
Econometric Analysis (1)

- Frankel-Wei (1994) currency co-movements factor model.

- Fratzscher and Mehl (2014): evidence of rising Chinese monetary dominance.

A standard Frankel-Wei regression can be written in its most general form as:

$$(1) \qquad \Delta \ln \frac{X_t}{Num\acute{e}raire_t} = \alpha + \sum_i \beta_i \, \Delta \ln \frac{Reference_{i,t}}{Num\acute{e}raire_t} + \gamma'_t \mathbf{\Pi}_t + \epsilon_t$$

Econometric Analysis (2)

- Three factor models (two stages to obtain a regional factor)
- Measures the symmetry of co-movements with respect to each factor

$$\Delta e_{i,t} = \alpha_i + \beta_{i,t}^{GBP}\Delta e_t^{GBP} + \beta_{i,t}^{FFR}\Delta e_t^{FFR} + \beta_{i,t}^{REG}\Delta e_t^{\widehat{REG_i}} + \gamma_t BIDASK_t +$$

(2)

$$+ \delta_t^{BOE} BOE_t + \delta_t^{BDF} BDF_t + \epsilon_t$$

(3) $$\Delta e_t^{REG_i} = \alpha_i + \beta_t^{GBP}\Delta e_t^{GBP} + \beta_t^{FFR}\Delta e_t^{FFR} + \omega_t$$

(4) $$\Delta e_t^{\widehat{REG_i}} = \omega_t$$

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(4)
$$\Delta e_t^{\widehat{REG_i}} = \omega_t$$

Econometric Analysis (3)

- The estimated anchor currency factors represent the degree of monetary policy autonomy / monetary dominance vis-à-vis each anchor country.

- Monetary dominance is likely to reflect drivers of cyclical synchronization (trade, financial links).

- Regions with similar monetary dominance should experience lower costs of monetary integration.

Results (1): Monetary Dominance in the Pre-Gold Standard Period

- First trade and financial globalisation provides incentives for international monetary integration. <u>Why the Gold Standard?</u>

- Fundamentals (Kindelberger, 1978), transactions costs (Redish, 1995), network externalities with German "tipping the balance" (Eichengreen, 1998): gold standard was inevitable.

- Flandreau (1996): random events! The French bimetallic system was extremely resilient pre-1870 and still credible by 1876 (Flandreau and Oosterlinck, 2013). Rising French capital exports provided strong incentives to monetary integration around the Franc (Flandreau, 2000; Einaudi, 2001).

Results (1): Monetary Dominance in the Pre-Gold Standard Period

- The debate on the origins (and the inevitability) of the international gold standard can be re-framed in terms of monetary dominance.

- Was the European monetary system unipolar and subject to British dominance? Or France also was a driver of the monetary system?

- Contribute to the debate by estimating equation (2) in panel.

Table 5: Equation 2 Panel Estimation (1852-1869)

	All Financial Centers[a]			Core Financial Centers[b]		
	(1)	(2)	(3)	(4)	(5)	(6)
British Factor	0.893***	0.903***	0.908***	0.365***	0.377***	0.392***
	(0.0704)	(0.0695)	(0.0761)	(0.0480)	(0.0465)	(0.0487)
French Factor	0.06094	0.054374	0.051005	0.373***	0.359***	0.349***
	(0.0786)	(0.0778)	(0.0751)	(0.0498)	(0.0481)	(0.0472)
Regional Factor		0.192***	0.191***		0.128***	0.122***
		(0.0382)	(0.0377)		(0.0417)	(0.0419)
Bid-Ask Spread			-0.11502			-0.206**
			(0.1181)			(0.0908)
Bank of England			-0.00012			-0.00025**
			(0.0002)			(0.0001)
Bank of France			0.000128			0.000085
			(0.0003)			(0.0001)
Observations	10,550	10,550	10,550	5,123	5,123	5,123
Adj. R-squared	0.055	0.088	0.089	0.097	0.191	0.198

Notes: Constant and fixed effects included in all the specifications. Robust standard errors are reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% respectively.
[a] All financial centers included except the ones mentioned in Footnote 13 due to collinearity issues.
[b] Anvers, Hamburg, Frankfurt, Berlin, Genoa, Leghorn, Lisbon. Leghorn exits the sample once it starts being quoted in Italian Lire in 1860

Figure 2: Relative Size of Anchors' Dominance (British Factor / French Factor)*
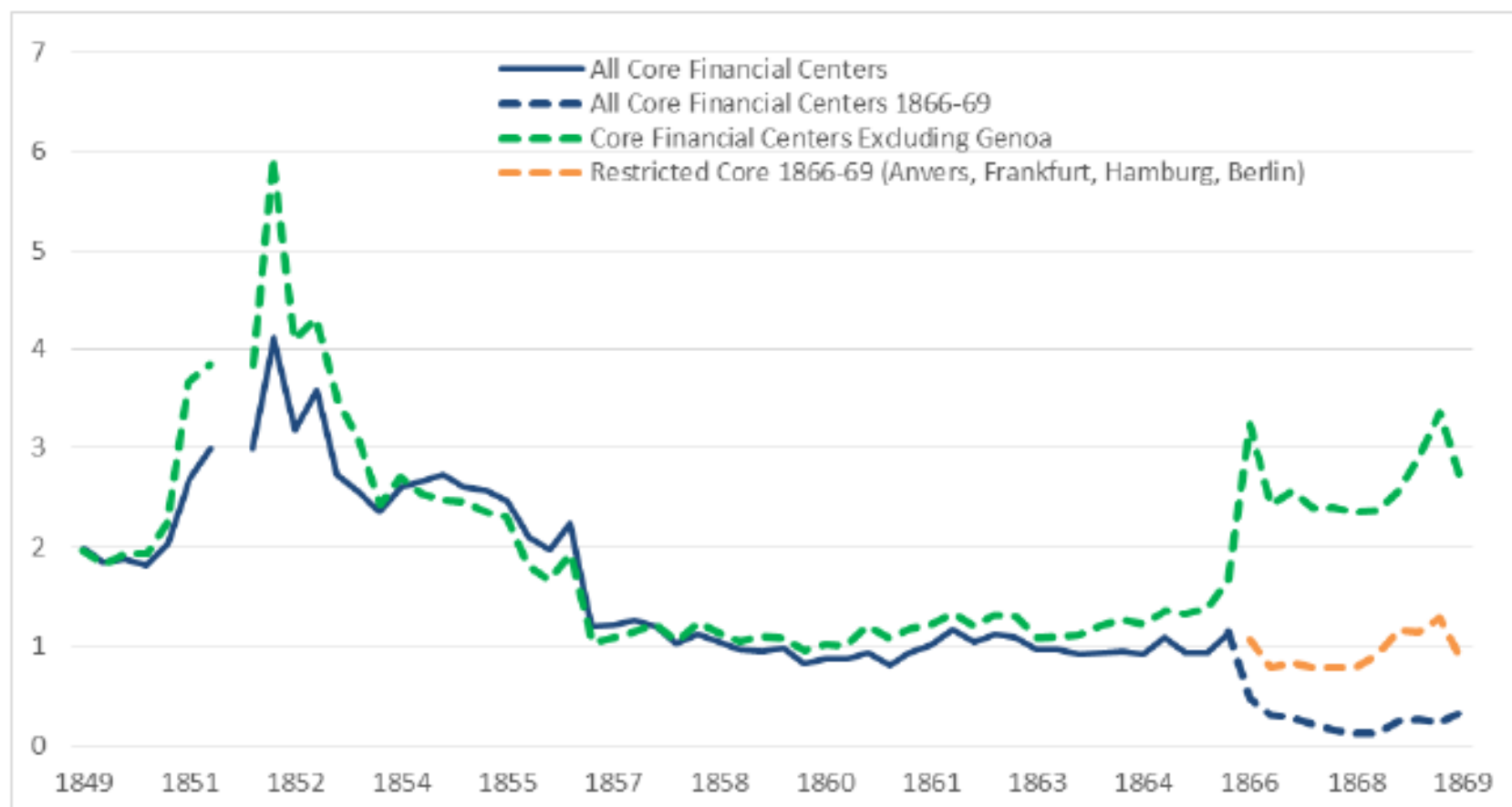
*The lines are obtained by computing the ratio of β^{GBP} over β^{FFR} from Equation 2, estimated through 4-years rolling regression. Core Financial Centers: Anvers, Frankfurt, Hamburg, Berlin, Genoa, Leghorn, Lisbon. Leghorn drops from the sample as soon as it starts to be quoted in Italian Lire in 1860.

Results (1): Summary

- Core vs. Periphery.

- Rising French dominance (including in Germany) and strongly bipolar European Monetary core.

- Confirms Flandreau's view against the inevitability of the international Gold Standard and the economic rationale of the Latin Monetary Union project.

- Had France not been defeated in 1870, it is plausible to imagine further international monetary integration around France.

Results (1): Explaining Monetary Dominance

- Are the factors driven by policy choice or fundamentals (trade and financial linkages)?

Table 6: Determinants of the Heterogeneity in the Estimated Individual Factors

	British Factor				French Factor			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trade per Capita	0.115		0.148	**0.193*****	**0.154*****		**0.153*****	-0.00825
	(0.0783)		(0.0939)	**(0.0685)**	**(0.0345)**		**(0.0292)**	(0.0733)
Trade Balance per Capita		-0.0158	0.0635	**0.208*****		0.129	0.00682	0.141
		(0.0676)	(0.0797)	**(0.0499)**		(0.109)	(0.102)	(0.171)
d_Bimetallic				**-0.709*****				**0.479****
				(0.119)				**(0.189)**
d_Gold				**0.253****				-0.305
				(0.0980)				(0.193)
d_Paper				0.223				-0.169
				(0.185)				(0.163)
Constant	-0.906	**0.811*****	-1.402	**-1.983***	**-0.792*****	0.0758	**-0.786*****	0.0853
	(1.137)	**(0.0660)**	(1.374)	**(1.022)**	**(0.225)**	(0.0485)	**(0.189)**	(0.397)
Observations	83	83	83	83	93	93	93	93
R-squared	0.029	0.001	0.035	0.348	0.218	0.031	0.218	0.282

Robust standard errors are reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% respectively.
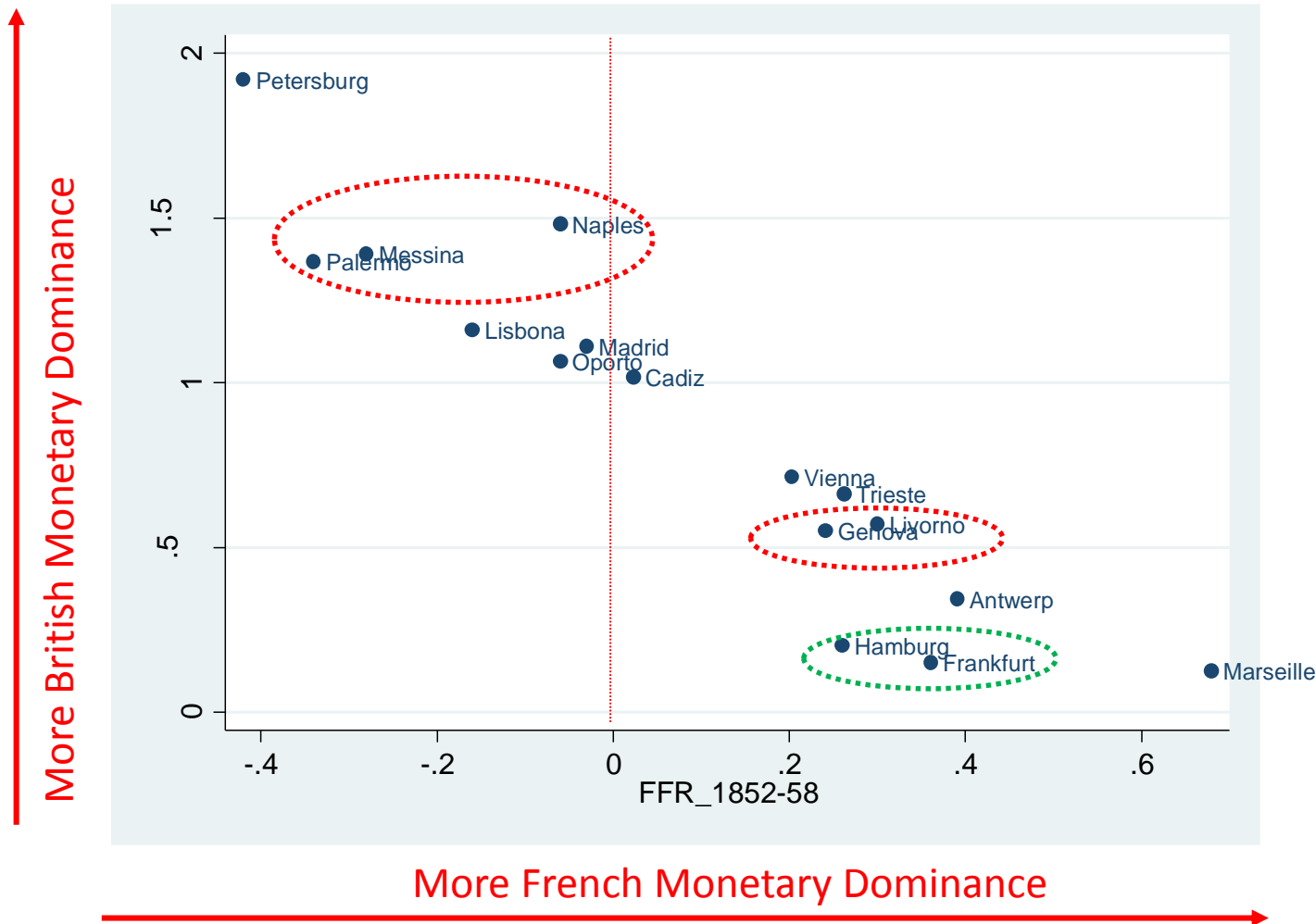
Results (2): OCAs and National Unification in Italy and Germany

- The «Spring of Nations» contributes to European monetary integration in Italy (exogenous) and Germany (endogenous).

- Italy: Cavour and Napoléon negotiated a loose confederation of Italian States in 1858→ Full political and economic unification is largely the product of random military events (Garibaldi expedition). Very little intra-Italian economic integration pre-unification (Federico and Tena, 2013).

- Germany: centuries of institutional integration (Chilosi et al., 2016), economic and monetary integration started at the beginning of the century (James, 1997).

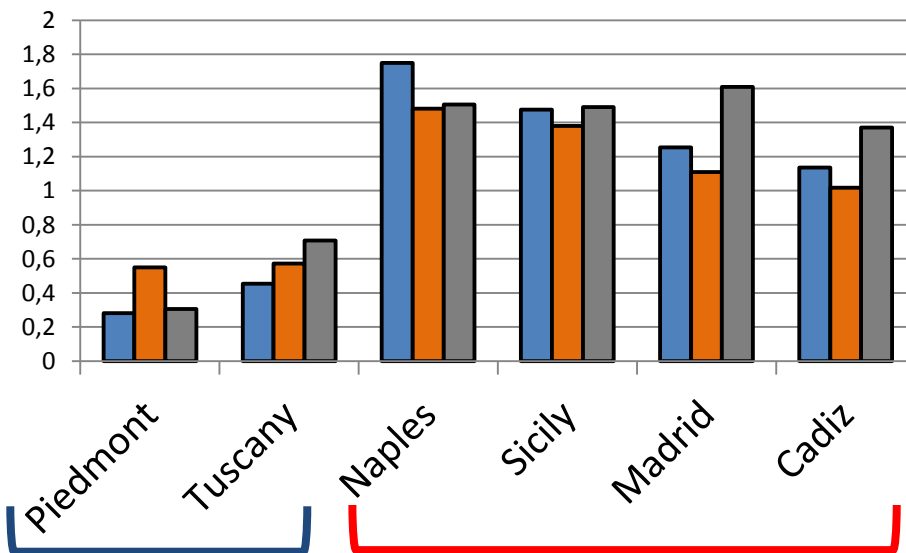# Results (2): OCAs and National Unification in Italy and Germany

- Run Frankel-Wei regressions individually for each financial center.

- Compare monetary dominance (estimated factor coefficients) across monetary unification «candidates».

Results (2): OCAs and National Unification in Italy and Germany

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British Factor Coefficient

French Factor Coefficient

Legend: 1846-51, 1852-58, 1859-65

Categories: Piedmont, Tuscany, Naples, Sicily, Madrid, Cadiz

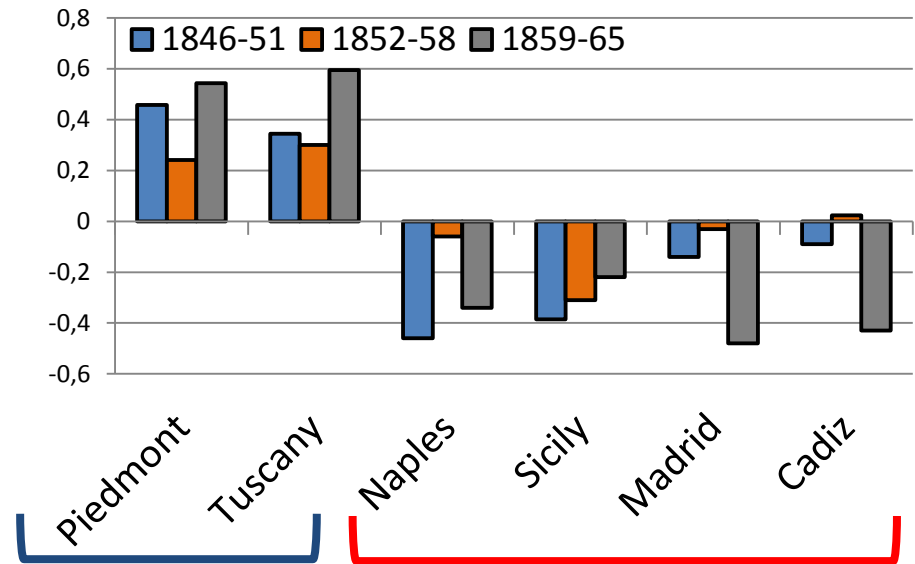# Results (2): OCAs and National Unification in Italy and Germany

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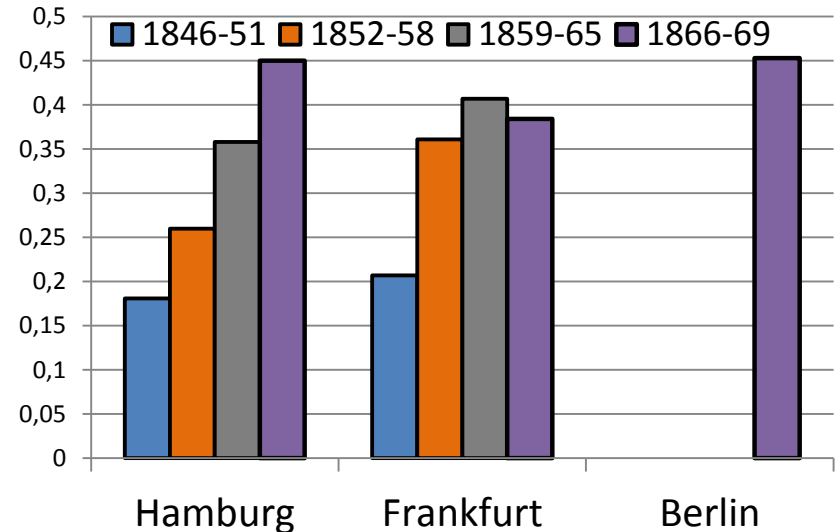
Results (2): Summary

- German regions were more likely to form an OCA, they will experience comparatively less divergence post-unification.

- Evidence of high macroeconomic costs of monetary integration for Italian regions (Two Sicilies and Spain might have formed more of an OCA). Role of monetary unification in the Southern Question?

- Ex-ante sub-optimality but what endogenous effects of monetary integration?

Implications (1): Endogenous Effects of Monetary Integration

- Frankel and Rose (1998): Monetary union→ Trade integration→ Cyclical convergence.

- Krugman (2001): Monetary union→ Trade specialization→ Cyclical divergence, hysteresis.

- Italy: starting point of high cyclical divergence on the back of different specialization and trade partners. Which model fits post-unification experience?

Implications (1): Endogenous Effects of Monetary Integration

Krugman Index of dissimilarity amongst pairs of Italian provinces
1=the pair did not share the same currency before unification
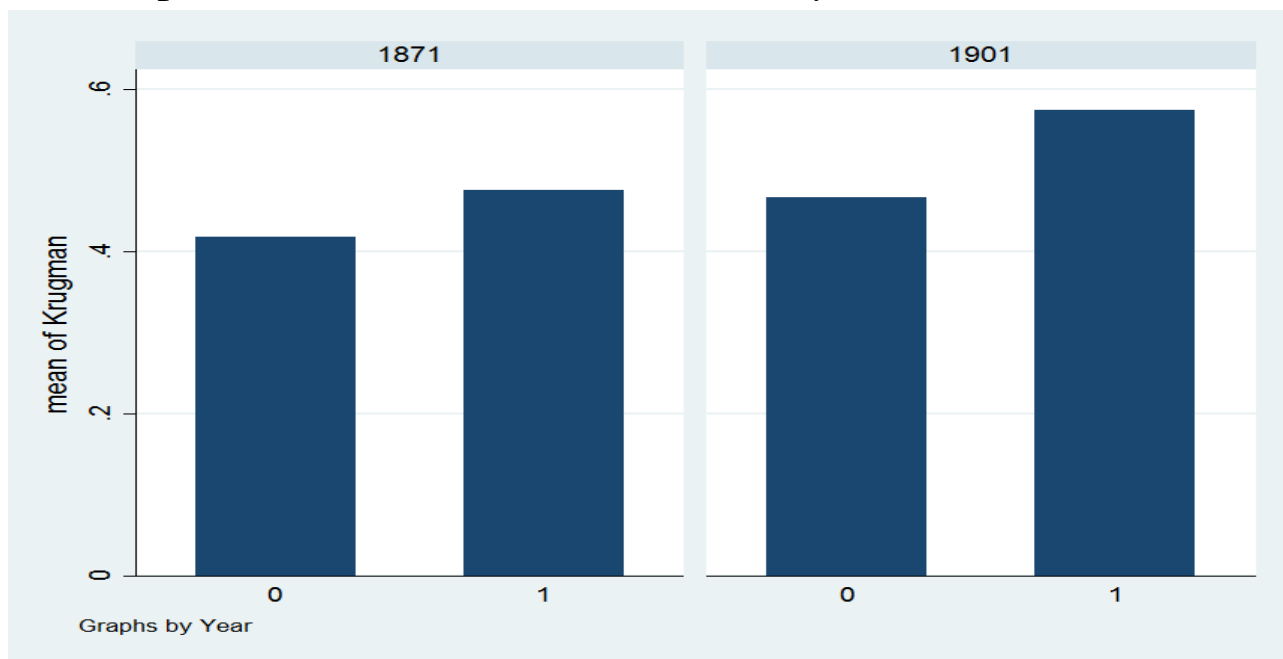
- In line with Krugman's view, average dissimilarity amongst pairs of Italian provinces that did not share the same currency pre-unification increased markedly post-unification.

Implications (1): Endogenous Effects of Monetary Integration

$$K_{i,j,t} = c + CU\_d_t + Distance_{i,j} + `X_{i,j} + Polity_{m,n,t} + \varepsilon_{i,j,t}$$

- K : Krugman index of dissimilarity across industrial production sub-components

- CU_d: takes value of one in 1901 if the pair of provinces were not part of the same currency area pre-unification. 'X: time varying correlates expressed in terms of absolute log difference between each province in the pair

- Time varying polity pair fixed effects: controls for time varying heterogeneity amongst pre-unitary polity pairs (eg. Tuscany-TwoSicilies).

Monetary integration associated with an increase of around one standard deviation in the dissimilarity index between provinces pairs

Dependent Variable: Industrial Production Dissimilarity amongst Provinces Pairs (Krugman Index)

	OLS (1)	OLS (2)	OLS (3)	FE (4)
CurrencyArea_d	**0.107***	**0.0642***	**0.197***	**0.154***
	-0.0106	-0.0108	-0.0242	-0.0143
literacy		**0.00217***	**0.000563***	-0.000811
		-0.000259	-0.000298	-0.000765
density		**0.0636***	**0.0408***	**-0.0619****
		-0.00647	-0.00576	-0.0245
actpop		**0.00247***	**0.00267***	**0.00184***
		-0.00056	-0.000514	-0.000591
agripop		**-0.000458***	-0.000363	**0.00168***
		-0.000278	-0.000254	-0.000296
distance		**5.09e-08***	**2.75e-07***	
		-1.53E-08	-2.03E-08	
Constant	**0.461***	**0.349***	**0.347***	**0.407***
	-0.00412	-0.00814	-0.0146	-0.0221
Observations	4,692	4,692	4,692	4,692
R-squared	0.059	0.125	0.263	0.342
Cross Section Fixed Effects	-	-	-	YES
Time Fixed Effects	YES	YES	YES	YES
Time Variant Polity Pair Fixed Effects	-	-	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Implications (2): Monetary Integration and the Southern Question

- Ex-ante assymmetry of shocks

- Italian unification drives even more regional specialisation, further increasing vulnerability to assymetric shocks

- Monetary policy during the 1880s agrarian crisis: Italy (gold «shadowing») vs. Spain (devaluation)

- (Partial) external adjustement in Southern Italy takes place through labour emigration

- Hysteresis post terms of trade asymmetric shock might partially explain the widening North-South gap by the turn of the century.

Conclusion

- The pre-Gold Standard monetary system was bi-polar, both British and French monetary dominance, the Gold Standard was not "inevitable".

- High costs of monetary unification for Italian regions when compared to German ones. Possible role of asymmetric shocks in the arising of Southern Question.

- Evidence in favour of the Krugman's (2001) view on the endogenous effects of monetary integration: looking at the Italian experience monetary integration is associated with increased dissimilarity across regions.
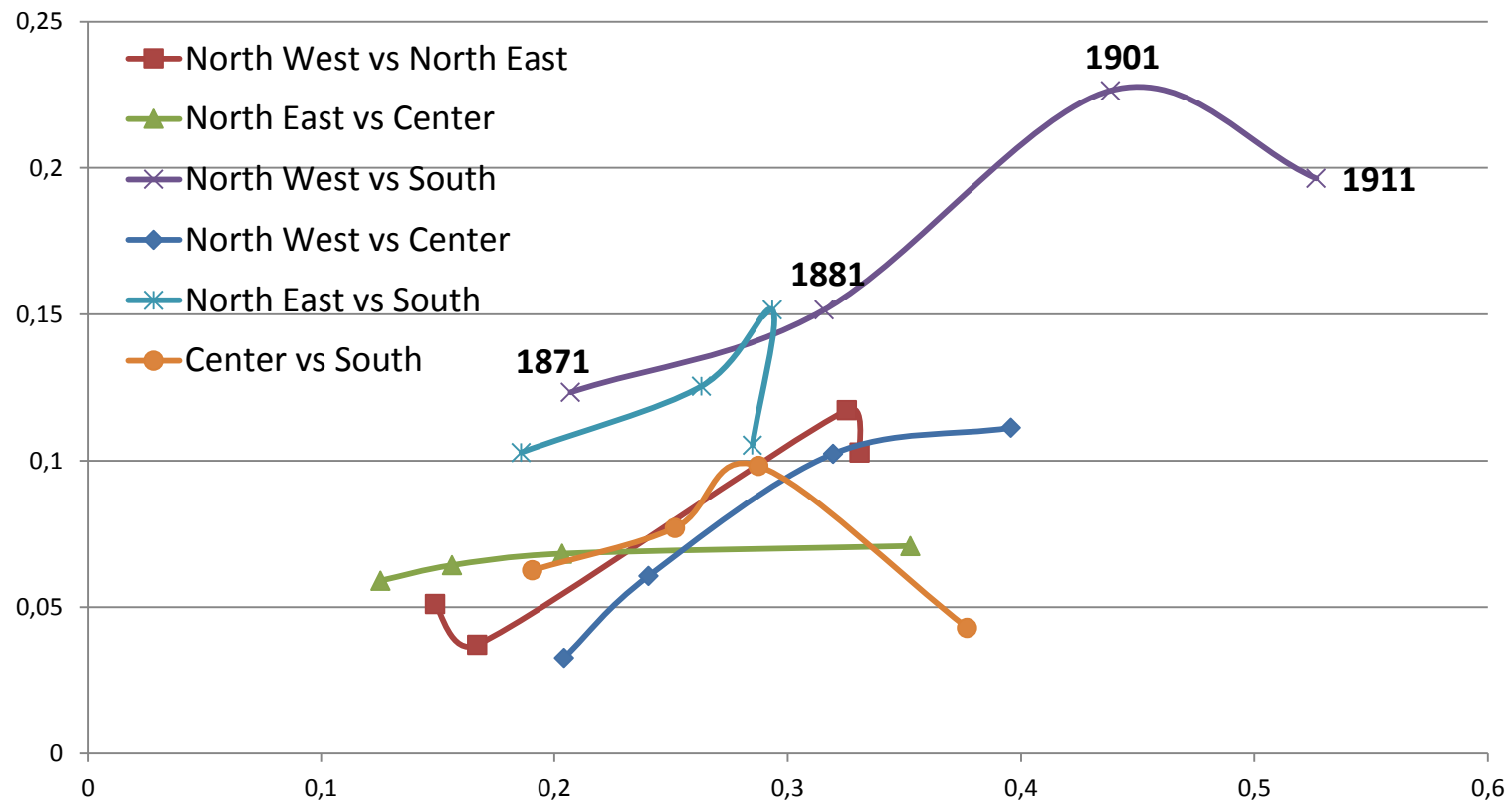
Thank You

Annex

Specialization Patterns in Post-Unification Italy

Krugman Index calculated on Fenoaltea (2003) estimates of regional industrial production

Annex (1)

	British Factor				French Factor				Regional Factor			
	1846-51	1852-58	1859-65	1866-69	1846-51	1852-58	1859-65	1866-69	1846-51	1852-58	1859-65	1866-69
Hamburg	0.231***	0.201**	0.120*	0.244***	0.181**	0.260***	0.358***	0.450***	0.043	0.033	0.021	0.058***
Frankfurt	0.436***	0.151**	0.305***	0.285***	0.207***	0.361***	0.407***	0.384***	0.002	0.042*	-0.00	-0.11***
Berlin	-	-	-	0.400***	-	-	-	0.453***	-	-	-	0.074***
Antwerp	0.241***	0.344***	0.179***	0.569***	0.491***	0.391***	0.619***	0.256***	0.032	0.024**	0.019*	0.087***
Marseille	0.152***	0.126***	0.078**	0.340***	0.635***	0.679***	0.798***	0.499***	0.024	0.021**	0.019**	0.022*
Genova	0.281***	0.550***	0.305***	0.013	0.458***	0.241***	0.543***	0.282	0.063***	-0.00	0.008*	0.048**
Livorno	0.454***	0.572***	0.707***	-	0.344***	0.300***	0.595**	-	0.032***	0.005	0.013**	-
Naples	1.749***	1.482***	1.505***	-	-0.46***	-0.06	-0.34	-	0.400***	0.175**	0.841***	-
Palermo	1.439***	1.367***	1.498***	-	-0.37***	-0.34***	-0.25*	-	0.352***	0.467***	0.601***	-
Messina	1.513***	1.392***	1.482***	-	-0.40***	-0.28***	-0.19	-	0.308***	0.432***	0.618***	-
Milano (Lira)	-	-	0.258***	0.240	-	-	0.581***	0.256	-	-	0.021***	0.025
Livorno (Lira)	-	-	0.219***	0.050	-	-	0.626***	0.184	-	-	0.020***	0.043*
Palermo (Lira)	-	-	0.105	0.406	-	-	0.807***	0.095	-	-	0.007	0.038*
Naples (Lira)	-	-	0.178*	0.246	-	-	0.725***	0.067	-	-	0.011	0.047**
Messina (Lira)	-	-	0.124	0.208	-	-	0.785***	0.241	-	-	0.011	0.015
Madrid	1.254***	1.110***	1.609***	1.119***	-0.14	-0.03	-0.48***	0.300	0.387***	0.173***	0.215***	0.274***
Cadiz	1.135***	1.017***	1.370***	1.262***	-0.09	0.023	-0.43***	-0.27	0.401***	0.047	0.230***	0.079**
Lisbona	1.154***	1.159***	1.320***	1.237***	-0.17	-0.16	-0.10	-0.22*	0.243**	0.186***	0.113***	0.089***
Oporto	1.063***	1.065***	1.120***	1.558***	-0.16	-0.06	-0.05	-0.54***	0.069	0.076***	0.164***	0.056**
Petersburg	0.444**	1.920***	1.451***	0.679	-0.27*	-0.42	0.013	-0.24	0.280*	0.394**	0.471***	0.614***
Trieste	0.652***	0.662***	0.701	0.943*	0.148	0.262	-0.59	-0.03	0.209**	0.178	0.900	0.407***
Vienna	0.671***	0.714***	0.714	1.066*	0.216	0.203	-0.57	-0.02	0.256**	0.157	0.883	0.406***

Annex (2)

	Bid ask				Bank of England				Banque de France			
	1846-51	1852-58	1859-65	1866-69	1846-51	1852-58	1859-65	1866-69	1846-51	1852-58	1859-65	1866-69
Hamburg	0.132	-0.07	0.056	-0.03	-	-0.00090***	-0.00031**	-0.00023	-	0.000226	-0.00016	0.000930*
Frankfurt	0.052	-0.07	0.056	-0.20***	-	-0.00054**	-3.96744	0.000449	-	-0.00029	-0.00062***	0.001014
Berlin	-	-	-	0.088*	-	-	-	-0.00021	-	-	-	0.001492**
Antwerp	0.041	-0.04	0.069	0.134***	-	-0.00044***	-5.39719	0.000235	-	-0.00017	-0.00033**	0.000691*
Marseille	-0.03	-0.10***	-0.05	0.003	-	-0.00076***	-0.00031***	-0.00011	-	-0.00105***	-0.00083***	-0.00092***
Genova	-0.00	0.009	0.123*	-1.93***	-	-0.00072***	-8.06414	0.000870	-	-0.00080***	-0.00079***	-0.00295
Livorno	-0.09	-0.13*	-0.38**	-	-	-0.00073**	-0.00063	-	-	-0.00068*	-0.01804***	-
Naples	-0.17	-0.75***	0.099	-	-	0.000637	-3.26740	-	-	-0.00078	0.000133	-
Palermo	-0.11	-0.10	-0.25	-	-	0.000129	7.595547	-	-	0.000756*	0.000083	-
Messina	-0.19*	-0.12	-0.10	-	-	0.000488	-6.32712	-	-	0.000354	5.334916	-
Milano (Lira)	-	-	0.017	-1.41***	-	-	-0.00014	0.000155	-	-	-0.00050***	-0.00252
Livorno (Lira)	-	-	0.069	-1.95***	-	-	-0.00016	0.000638	-	-	-0.00051***	-0.00212
Palermo (Lira	-	-	-0.02	-1.10***	-	-	-0.00028	0.000780	-	-	-0.00057**	-0.00404
Naples (Lira)	-	-	-0.00	-1.64***	-	-	-0.00026	0.000880	-	-	-0.00054**	-0.00311
Messina (Lira	-	-	-0.00	-1.48***	-	-	-0.00025	0.000354	-	-	-0.00057**	-0.00284
Madrid	-0.07	0.024	0.173	0.002	-	0.000633	8.694969	0.001254*	-	0.000893*	0.000297	0.000856
Cadiz	0.160	-0.08	0.026	-0.07	-	0.000742**	-1.45223	-7.13333	-	-0.00064	0.000816**	-0.00094
Lisbona	-0.08	-0.09	0.025	0.048	-	0.000247	4.250382	-0.00040	-	-0.00034	8.172098	0.001287
Oporto	0.101	0.012	0.109	0.173**	-	-0.00002	0.000152	-0.00031	-	0.000190	5.861490	0.000188
Petersburg	0.661***	0.290	0.530	0.820**	-	0.003649***	0.001072*	0.005523***	-	0.003117**	0.001348	-0.00435
Trieste	-0.34**	-0.06	-2.73***	-1.84***	-	-0.00094	0.000295	-0.00454**	-	-0.00211**	-0.00332*	-0.00036
Vienna	-1.98***	-0.25	-2.50***	-1.93***	-	-0.00084	-0.00010	-0.00595***	-	-0.00274***	-0.00380**	0.001015