Optimum Currency Areas and European Monetary Integration: Evidence from the Italian and German Unifications

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November 2017

Abstract

Recent events have sparked renewed research interest in international monetary integration and currency areas. This paper provides new empirical evidence on the predictive power and endogeneity of the Optimum Currency Areas (OCA) framework, by analyzing the wave of European monetary integration occuring between 1852 and the establishment of the international gold standard. This period witnessed to the creation of two national monetary unions lasting to this day, Italy and Germany, as well as monetary integration around Britain and France. I estimate the ex-ante optimality of various monetary arrangements, relying on a newly collected dataset allowing to proxy the assymetry of shocks across European regions. My findings support the predictive power of the OCA framework. In particular, I find that, opposite to Germany, Italian pre-unitary states did not form an OCA at unification. I argue that this might have contributed to the arising of the Italian "Southern Question". I then explore a possible channel through which monetary integration might aggravate regional inequality, by investigating the endogenous effects of monetary integration. Looking at the Italian monetary unification, I find evidence in support of Krugman's (1993) pessimist view on the endogenous effects of monetary integration, where integration-induced specialization and factor mobility increase the risk of asymmetric shocks and regional hysteresis phenomenons. On the other hand, the experience of the Italian and German unification does not seem to be characterized by the OCA endogeneity theorized by Frankel and Rose (1998).

Keywords: Optimum Currency Areas, Endogenous Effects of Monetary Integration, Italian and German Monetary Unification.

JEL classification: F45, F33, F15, N13

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1. Introduction

The creation of the Euro Area as well as the crisis the common currency has experienced since 2010 have inspired renewed research interest in international monetary integration and the optimum currency areas (OCA) framework. Particularly, the relationship between business cycles synchronization and the optimal boundaries of currency areas has featured prominently in the academic and policy debate. Even before the Maastricht treaty came into force in 1992, a number of empirical studies doubted whether the soon to be EMU was an OCA (Bayoumi and Eichengreen, 1992; De Grauwe and Vanhaverbeke, 1991). They generally found evidence of a core-periphery dichotomy in the European economy (Eichengreen, 1991) and advised for a cautious approach to EMU membership, favoring a "multi-speed" monetary integration (Von Hagen and Neumann, 1994). More recently, as the choice of letting Greece and other peripheral countries in the "Club" was widely blamed for the common currency existential crisis, new evidence of core-periphery divergence emerged (Bayoumi and Eichengreen, 2017; Belke et al., 2017), together with radical proposals favoring a split of the EMU along revised boundaries (Bootle, 2012; Stiglitz, 2016).

Interestingly, Mongelli (2008) notes how small the input from the OCA theory had been in the official EMU preparatory works (such as the Delors Report) and the mechanisms to determine EMU membership. While the Maastricht treaty defined "convergence criteria" to comply with before EMU accession, those criteria were neither fully enforced nor necessarily derived from the OCA framework. European officials' lack of interest towards determining optimal membership obviously reflected political factors. Nevertheless, it also was symptomatic of the then prevailing consensus (Commission, 1990) over the endogenous effects of monetary integration. There are indeed two conflicting theories regarding the effect of economic integration on business cycles synchronization. On the one hand, the "European Commission view", also known as the OCA endogeneity theory following Frankel and Rose (1998), holds that monetary integration would endogenously lead to greater cyclical synchronization and the fulfillment of the OCA criteria. On the other end, the "Krugman view" (Krugman, 2001) holds that a reduction in transaction costs, such as a common currency, leads to greater specialization and thus higher risks of asymmetric shocks and cyclical divergence.

The two views imply dramatically different policy prescriptions. The Krugman view cautions against forming a monetary union when cyclical synchronization is low, as the latter is likely to endogenously worsen once further integration kicks in. On the contrary, according to the OCA endogeneity view, a priori optimality is of little concern as the OCA framework has little or no ex-ante predictive power: the borders of new monetary areas should actually be drawn larger, in the expectation that integration and synchronization will increase ex-post.

The present paper contributes to this debate by looking at past examples of international monetary integration. In particular, the paper investigates the wave of European monetary integration occurring in the third quarter of the 19th century. While this period witnessed to the rise of Britain and France as international monetary anchors, it also saw the formation of "national" monetary unions lasting to this day, in Italy and Germany. The Italian case is the focus of the paper given the exogeneity of the Italian monetary unification, achieved through military means, and Italy's longstanding history of regional divergence and North-South economic, cultural and political divide. The German experience of monetary unification provides an interesting point of comparison, as it followed a long period of institutional and economic integration.

The paper provides an empirical contribution on two levels.

First, it tests the predictive power of the OCA framework, by estimating OCA derived ex-ante optimal monetary boundaries of Europe in the period at hand. I make the empirical analysis of OCA tractable relying on an anchor-client framework of monetary integration and the symmetry of nominal shocks with respect to anchors, following work by Alesina and Barro (2002) and Bayoumi and Eichengreen (1997). To this end, I exploit a newly compiled dataset of twice-weekly foreign exchange bills prices quoted in London on about twenty European cities between 1846 and 1869, including six Italian financial centers representing four pre-unitary monetary zones and three German pre-unitary financial centers.

Second, I investigate the endogenous effects of monetary integration, testing for evidence of a Krugman-view style wave of specialization in the decades following monetary integration. In particular I try to identify whether pairs of provinces that exogenously became members of the Italian monetary union experienced further divergence in their economic structure compared to

pairs of provinces that were already integrated with one another. A future version of the paper will attempt to integrate German data in the analysis.

My findings indicate that Italy was not an OCA at unification. A centralized Italian monetary union is therefore likely to have implied large macroeconomic costs. On the other hand, shocks across German regions where largely symmetrical, suggesting substantially lower costs of monetary integration.

The predictive power of the OCA framework is found to be relatively good. The actual boundaries of gold standard core are for example identified as soon as the 1850s. Additionally, the monetary union faring worst ex-ante in terms of optimality, Italy, still exhibits to this day a worst track record in terms regional divergence and shock synchronization compared to Germany. In this respect I argue that Italy saw "Krugman-view" endogenous effects dominating over Frankel and Rose OCA endogeneity ones. Controlling for a number of characteristics relevant for economic specialization, pairs of provinces belonging to two distinct Italian pre-unitary states are found to experience a significant increase in their economic structure's dissimilarity post economic integration, compared to a control group.

Overall, my findings suggest that the Italian monetary unification might have played a role in the arising of the country's "Southern Question". In the presence of differing economic structures between the North and the South, the deflationary shock to global agricultural prices in the 1880s is likely to have been asymmetric in nature and, consistent with Krugman (2001)'s theoretical framework, might have induced persistent hysteresis effects on Southern Italy's growth potential.

Section 2 provides a discussion of the literature on currency areas and the history of European monetary integration in the 19th century; Section 3 describes the newly collected dataset exploited in the paper; Section 4 details the empirical framework; Section 5 discusses the implications of my results.

2. International Monetary Integration: Theory, Practice and History

This section provides a literature review, focusing on some theoretical and empirical aspects of the OCA framework (Section 2.1) and the relevance of the pre-Gold Standard historical context for the debate on international monetary integration (Section 2.2).

2.1. Monetary Policy Independence, Anchor Currencies and Optimal Monetary Boundaries

The question of the optimal number of currencies globally has first been analyzed by the pioneering work of Mundell (1961). Its Optimum Currency Area (OCA) framework still remains the main theoretical prism through which international monetary integration is analyzed[1]. Mundell's original insight stresses two opposing forces shaping the microeconomic benefits and macroeconomic costs of monetary integration and, consequently, defining OCA. On the benefits side, sharing a common currency reduces transactions costs for trade and financial transactions. Indeed, similarly to a language, a currency implies network externalities and increases its utility with its usage. A seminal contribution by Rose (2000) found empirical evidence on the positive trade effect of currency unions, even though its magnitude and significance have been the subject of much discussion Tenreyro (2007). The focus of the present paper is however on the cost side of the Mundell's framework: monetary integration implies a loss in monetary policy independence for the regions taking part in it. This means that regions within a monetary union are vulnerable to shocks that are asymmetric to the ones experienced by the currency area as a whole.

The theoretical costs of monetary integration were substantially downplayed alongside the decline of keynesianism and Barro and Gordon (1983)'s critique of discretionary monetary policy. The theoretical underpinnings of the OCA framework have since been updated accordingly. Alesina and Barro (2002) notably introduce the notion of "anchor-client relationship" as a key driver of international monetary integration. Indeed, currency areas arrangements around the word mostly involve a large and stable "anchor" country whose currency is adopted by smaller, less credible

[1] De Grauwe (2016) and Mongelli (2008) provide an extensive literature review on the evolution of the framework.

"clients". Alesina and Barro argue on the one hand that there is then a major benefit to monetary integration which was overlooked by the original OCA framework: adopting the currency of an anchor country "buys" credibility for the client country, also providing a commitment to stability that is harder to disown (it is costly to reintroduce your own currency once you adopt a new one). Conversely, they underline how the benefits of independent monetary policy for most countries are likely to be low due to the time inconsistency problem of monetary policy. This not only means that the costs to monetary integration are on average lower than assumed by the original OCA framework. It also follows that, within an anchor-client framework, the costs of international monetary integration essentially depend on the degree of price and output co-movements with respect to a potential anchor.

While Alesina and Barro do not go as far as including the Euro Area in the "anchor-client" framework, the so-called "German dominance hypothesis" was a recurrent theme of the policy debate prior to the introduction of the Euro. It was first argued empirically by Giavazzi and Giovannini (1988) that pre-Maastricht Europe essentially was a "Deutsche-Mark" zone with Germany in the role of the anchor country setting monetary policy for the whole region. Their results were disputed, notably emphasizing German monetary "independence" rather than "dominance" (Fratianni and von Hagen, 1992). Nevertheless, it is well accepted that François Mitterand's initiative to accelerate European monetary integration, in exchange for a French green light to the German reunification, was predicated on the basis that it would have helped dilute German monetary "dominance", re-equilibrating the balance of economic power within the Franco-German "couple" (Vernet, 2003).

The haste of the French authorities to lock in a common currency agreement only partially explains the little attention played by European officials to the OCA framework and the issue of the "optimal boundaries" of the EMU (Mongelli, 2008). The "convergence criteria" defined at Maastricht had indeed at best a weak theoretical justification and were in any case loosely enforced[2]. The "optimism" of the French and European elites also reflected their beliefs regarding the endogenous effects of monetary integration. As it has been argued empirically by Frankel and

[2]This contrasted with the British authorities' approach, with the "Five Tests" report (Treasury, 2003) compiled by British Treasury featuring the lack of cyclical convergence as one of the key obstacles to EMU accession.

Rose (1998), the OCA criteria might well be endogenously self-fulfilling. The so-called "European Commission view" then implied that, regardless of the ex-ante fulfillment of the OCA criteria, economic integration was likely to foster convergence and cyclical synchronization over time, turning an a priori sub-optimal area into an optimal one. It follows that one should draw the borders of a currency area larger than what economic analysis would suggest ex-ante.

An alternative approach to the question of the endogenous effects of currency areas is the one put forward by Krugman (2001). It draws on the theoretical insights of the New Economic Geography (NEG) framework and the experience of regional business cycles within the United States. Krugman argues that reductions in transaction costs across regions in the presence of economies of scale are likely to foster regional specialization and dissimilarity in regional economic structures and business cycles. Monetary integration is therefore likely to increase the risk of asymmetric shocks and the costs of a "one size fits all" monetary policy. Furthermore, changes in the mobility of factors are also likely to have important implications in terms of adjustment to region-specific shocks. Consider a region experiencing an asymmetric adverse shock to the demand for its export industries. With immobile factors, relative prices in the region would adjust downward. This would attract new industries, limiting regional divergence and favoring, at least to some extent, "mean reversion" of regional output levels. On the contrary, perfect factor mobility would encourage factors to move away from the affected regions, with the adjustment taking place through quantities. This implies that in the absence of cyclical stabilization policies at the regional level, economic integration and factor mobility would make regional outputs look more like a random walk. In other words, not only economic integration might make asymmetric shocks more likely. It might also worsen the nature of their effect through an hysteresis phenomenon, permanently lowering the factor endowment of the affected region.

The original empirical claim of Frankel and Rose (1998) certainly remains widely influential, while the Krugman view received little direct attention by the empirical literature. Overall, the empirical evidence on the endogenous effects of monetary integration is mixed. Looking at a broad sample of currency arrangements Alesina et al. (2002) found a positive common currency effect on relative price synchronization but a negative one on output synchronization, while Giannone and Reichlin (2006) do not find any evidence of a Euro effect on European business

cycle synchronization. On the other hand, Böwer and Guillemineau (2006) argue that the first ten years of EMU confirmed the predictions of Frankel and Rose, whit specialization actually having a positive influence on EMU cyclical synchronization, given the prevalence of intra-industry trade. More caution over OCA endogeneity has been expressed since the crisis. Bayoumi and Eichengreen (2017) and Belke et al. (2017) nuance the idea of increased cyclical synchronization, which seems to apply only to certain parts of the EMU. Evidence of increased dissimilarity in the EMU's regions economic structure (Mongelli et al., 2016) calls for new empirical research into possible Krugman-type effects. As those effects are by definition long run in nature and only apply to areas where levels of integration and factor mobility are higher than the ones of the typical international monetary arrangement[3], the present paper analysis of past examples of national monetary integration provides a relevant empirical framework.

2.2. Monetary Integration at the Eve of the First Globalisation (1848-1870)

The two decades following the establishment of the French Second Empire in 1852 witnessed to a number of developments that brought about a wave of monetary integration in Europe.

First, an unprecedented rise of international trade and financial linkages increased incentives to pursue international monetary integration. On the one hand, the *laissez-faire* policies of Napoléon III led to widespread trade liberalisation following the signature of the Cobden-Chevalier treaty in 1860. On the other hand, capital exports from both England and France started to increase markedly in the 1850s (Lévy-Leboyer, 1977). Second, a technocratic ideology, on the rise in France and across Europe, emphasizing the need for international norm harmonisation, from unit of measures to currencies, is also likely to have contributed to the shift to further international monetary integration (Einaudi, 2001). Finally, the French Emperor approach to the nationality issue, as well as the rise of Prussia and Piedmont, allowed for a radical process of political (and therefore monetary) unification to take place in both Italy and Germany. A number of sovereign states disappeared in the process each with their own monetary standards.

At the international level, France attempted to shape the global monetary system around the

[3]Making empirical setting based on cross country analysis of little relevance.

French Franc, starting with the 1865 monetary convention[4], commonly referred to as the Latin Monetary Union. The monetary geography of Europe prior to the convention already showed widespread diffusion of France's bimetallic monetary standard. Belgium and Piedmont adopted the Franc Germinal system following their annexation as *départements* during the First Empire and kept it as their own after 1815, while Switzerland freely adopted it in 1850. A number of other countries, from Europe to South America, informally conformed their monetary standard to the one of the Convention, without however never officially joining it. Einaudi (2001) and Flandreau (2000) have emphasized the economic rationale of monetary integration around France. Indeed, the main impetus to the initiative came from the free-trade party inside the *Conseil d'Etat*, headed by Félix Esquirou de Parieu, a technocrat who "wished to be the Michel Chevalier of international currency". The expansion of French international trade and finance provided strong economic incentives for France to promote the initiative and other countries to join it. Flandreau argues that the 1865 monetary convention was predicated on the willingness of France to compete with London, on the back of rising external surpluses, as a global capital exporting center. Indeed, the French authorities were aware that London's financial role allowed Britain to gain a double advantage, in terms of dividend and interest payments as well as in furthering trade relations (as capital exports were mostly employed to buy goods from core countries). A number of countries, including Spain and Austria-Hungary in the late 1860s, agreed to take steps towards a French monetary standard as part of a wider package of trade liberalization and provision of loans from Paris. This highlights the relevance of Alesina and Barro (2002)'s "anchor-client" framework in the context of 19th century international monetary integration. The Italian authorities explicitly referred to their country's dependence on French trade and finance when justifying their choice of post-unification monetary standard in 1862 (Roccas and Sannucci, 1990). In the end, however, wider international monetary integration occurred around the British gold standard, following the French defeat in the 1870 Franco-Prussian war and the decision of the German Reich to adopt a gold standard. While war reparations temporarily put a stop to French capital exports, undermining the country's monetary dominance, the German switch to gold [5] tipped the balance of monetary "network externalities" in favor of the British monetary standard (Eichengreen, 1998).

[4]The participants to the convention were France, Belgium, Italy and Switzerland. Greece would join later on in 1868.

[5]As well as the lack of monetary cooperation between France and Germany (Flandreau, 1996; Flandreau and Oosterlinck, 2012)

While the international level is relevant to the "anchor-client" framework behind my empirical strategy, the focus of this paper is on "national" monetary integration [6]. The period at hand saw the formation of two large and long lasting national monetary unions, Italy and Germany.

Both the Italian and German monetary unifications have received little attention from the perspective of the OCA framework. An exception, in the case of Italy, is represented by Foreman-Peck (2005), who provide a number of descriptive evidence pointing to the pre-unitary Italian states, and particularly the Northern and Southern ones, not forming an OCA.

The Italian unification is nevertheless particularly worthy of attention in the light of the OCA empirical literature. Not only the Italian monetary union managed to survive to this date despite persistently divergent regional patterns. It also provides a rare example of "random" monetary integration on the back of military events, which does not suffer from the endogeneity issue that characterizes economic integration processes. In this respect Federico and Tena-Junguito (2014) highlights the weak intra-Italian trade integration pre-unification, suggesting no compelling endogenous reason to form a currency area. Indeed, the rapid move from Italy as a "geographical expression" to a centralized unified state with a common currency was not what the North-Western Italian elites had in mind when they started to negotiate a diplomatic alliance with the Second French Empire against Austria[7]. The Plombières agreement between Napoléon III and the Count of Cavour, Piedmont's prime minister, in 1858 merely saw Piedmont becoming the leader of a loose Italian confederation under French dominance. Only popular uprisings in the North and, above all, the risk of Garibaldi's militias taking power in the South pushed the Savoy monarchy and the European powers to go for an annexation by Piedmont of most of modern day Italy.

On the contrary, German institutional integration dates back to the Holy Roman Empire. Chilosi et al. (2016) find that as far back as the 16th century, financial market integration amongst German cities was substantially higher than amongst Italian ones. A formal process of political and economic integration started at the beginning of the 19th century with the creation of the

[6] In a separate work (Vicquery, 2017) I show that the sharp rise of French monetary dominance from the onset of the Second Empire supports Flandreau (1996)'s hypothesis that the international gold standard was not inevitable and that, had France not been defeated in 1870, the European monetary geography would have been different to the one that effectively materialized

[7] See Smith (1988) and Barbagallo (2013) for a detailed historical discussion.

Zollverein, together with measures to harmonize monetary standards (James, 1997; Holtfrerich, 1993). This process culminated with the establishment of the German Empire and the Mark in 1871.

A comparison of the ex-ante optimality of the Italian and German unifications is particularly interesting given the very different paths took by the two countries in terms of regional convergence post-unification. Determining how ex-ante optimality of monetary integration relates to ex-post regional divergence would provide an indication of both the predictive power of the OCA framework and the overall "sign" of the endogenous effects of integration in the case of Italy and Germany. Comparative data in Iuzzolino et al. (2013) shows that regional inequality - measured as the mean log deviation of GDP per capita - in Italy was in line with other major European economies in 1871. By 1911, however, Italian regional inequality was two times higher than in the UK and Austria and almost three times higher than in Germany. A similar relative order of magnitude persists to this day.

Even though many different channels contributed to this extreme phenomenon of regional divergence (Felice (2013) provides a very comprehensive review), it is also of interest to provide a tentative narrative of how monetary integration might have contributed to the "Southern Question". In particular, testing for the relevance of the "Krugman view" of the endogenous effects of economic integration in the first decades of unification would indicate how the unification itself, and monetary integration in particular, might have played a role in regional divergence. The role of agglomeration effects has long been emphasized in the literature on the Southern Question. Spatial economics patterns changed dramatically from the pre-unification starting point of a typical *ancien régime* pattern of agglomeration around the local capital (A'Hearn and Venables, 2011). The introduction of the Piedmontese tariff as soon as 1861 as well as, later in the 19th century, national market integration ignited a process of sectoral specialization and spatial change. Missiaia (2016) and Basile et al. (2015) find evidence of regional divergence in income to be driven by natural resources endowments and NEG mechanisms of agglomeration according to domestic market access.

The analysis in Section 4.2 builds on this literature by drawing a link between economic

integration, changes in regional specialization and the hysteresis effects discussed by Krugman (2001) in the context of the American monetary union.

3. Data

3.1. Sources

In this section I provide an overview of the original data collected for this paper. I compiled an original database of foreign-exchange bills prices quoted in London on 21 European financial centers. The quotes have been manually collected from The Economist from 1846[8] to 1869. Two quotes per financial center were recorded each week (on Tuesday and Friday), including a minimum and a maximum price which we interpret as bid-ask prices in line with Flandreau and Jobst (2005). With the exception of Paris and Amsterdam, which were also quoted "on sight", all quotes are for a 3 months maturity only. Table 1 summarizes the European cities for which FX-bills prices are included in the dataset and, if applicable, the year during which the quote is introduced[9]. All in all, the dataset is composed of 102,930 bid-ask observations, resulting in around 26,000 weekly observations exploited the analysis.

Additional data used in the clustering analysis in Section 4.1.1 have been retrieved from a number of secondary sources. Trade data are retrieved from the RICardo database (Dedinger and Girard, 2017) and Lampe (2008). Population data as well as government finance data are taken from Mitchell (1998), except for government finance data for Italy, Germany and Portugal which are from Dincecco (2009) and Dincecco et al. (2011).

Finally, data used in Section 4.2 to analyze the effect of integration on economic structure dissimilarity are from Ciccarelli and Fenoaltea (2013) and Missiaia (2014).

[8] When the "Course of Exchange" table starts to be published on a consistent basis. The analysis stops in 1869 as the Franco-Prussian War of 1870 marked a dramatic regime change in the international monetary system, as discussed in Section 2.2.

[9] I discard quotes on centers such as Bordeaux, Copenaghen or Venice which are recorded for only very brief intervals within the period of interest.

Table 1: List of Financial Centers Included in the Sample

Financial Center	**Polity**	**Availability**
Vienna	Austria-Hungary	Whole Period
Trieste	Austria-Hungary	Whole Period
Antwerp	Belgium	Whole Period
Paris	France	Whole Period
Marseille	France	Whole Period
Hamburg	Free City	Whole Period
Frankfurt	Free City (Prussia after 1866)	Whole Period
Leghorn	Tuscany (Italy after 1860)	Whole Period
Milan	Italy	1860-1869
Genoa	Sardinia (Italy after 1860)	Whole Period
Amsterdam	Netherlands	Whole Period
Rotterdam	Netherlands	Whole Period
Lisbon	Portugal	Whole Period
Oporto	Portugal	Whole Period
Berlin	Prussia	1865-1869
Petersburg	Russia	1847-1869
Madrid	Spain	Whole Period
Cadiz	Spain	Whole Period
Naples	Two Sicilies (Italy after 1860)	Whole Period
Palermo	Two Sicilies (Italy after 1860)	Whole Period
Messina	Two Sicilies (Italy after 1860)	Whole Period

Notes. Paris and Amsterdam quoted at both "sight" and three months maturity.

3.2. Descriptive evidence

This section provides some descriptive evidence on the state of the European monetary system and of both inter and intra-national monetary integration during the period of interest. Three features of the data are of particular interest.

Firstly, the European monetary system appears divided between a low nominal volatility "core" and a high volatility "periphery". Table 4 shows how the regions which will form the core of the international Gold Standard in the 1870s already shared similar levels of monetary stability about two decades earlier, between 1852 and 1858[10]. It is interesting to note that Northern Italy, which will not stably join the Gold Standard once part of unified Italy, also seems to belong to the "core" group, while the South of the peninsula clearly exhibits volatility levels in line with the system's "periphery". Inconvertible paper standards (Russia and Austria-Hungary) or weaker credibility of the metallic anchor (Spain and possibly Southern Italy) are obviously associated with the highest levels of volatility, while the four financial centers belonging to the bimetallic "Franc zone" show markedly lower levels of FX variability.

Secondly, the data show heterogeneity in the levels of intra-national money market integration. Table 5 shows the average difference in the value of the local currency in different financial centers which are part of the same monetary zone (as an example, between 1846 and 1852 a French Franc was worth on average 0.17% more in Paris than in Marseille). While this pricing differential seems to decline over the course of the period at hand, there is a neat differentiation between very low spread within the French national monetary union and the relatively high ones observed in longstanding national markets such as Spain and Portugal. At the same time, the spread between the value of the French Franc in Paris and of the Franc Germinal based currencies of Belgium and Piedmont is in the same order of magnitude of the one recorded within national monetary unions[11].

Of particular interest is, again, the case of unified Italy. Despite the marked asymmetry in

[10] The 1852-1858 period was selected as relatively stable from a political standpoint, between the 1848 uprisings and the start of the Italian Independence Wars in 1859.

[11] The declaration of inconvertibility of the Italian Lira following the beginning of the Italo-Austrian war of 1866 represents a game changer in this respect as it prompts a sharp devaluation of the Italian paper Lira.

nominal co-movements between pre-unitary Northern and Southern Italian financial centers (Table 2), the pricing of the Italian Lira is very homogeneous across the peninsula from the onset of monetary unification in 1863. The difference in the price of the Italian Lira between Genoa and Naples is by 1866-69 lower than the difference in the price of the French Franc between Paris and Marseille. Looking at Sicily, while a spread in the pricing of the Oncia of around 20bp persisted pre-monetary unification between Palermo and Messina, this difference disappears completely with the introduction of the Lira. Post-unification convergence also occurs in exchange rate co-movements across Italian regions. Table 2 shows how the FX-bills returns correlation amongst Italian centers increases dramatically after they all start to be quoted in Liras in 1863.

An homogeneous external pricing of the Lira across Italy implies that the annexed provinces benefited from 1863 onward of a substantial reduction in transactions costs, particularly *vis-à-vis* foreign partners, opening the door to the international trade benefits of monetary integration first analyzed by Rose (2000)[12].

The above descriptive evidences in favor of Italian monetary integration are, at least apparently, at odds with the existing literature. The homogeneous pricing of the Lira across the peninsula since 1863 particularly contrasts findings by Toniolo et al. (2003), highlighting very low level of financial markets integration well into unification, with different pricing of Italian public debt in the several regional exchanges. According to Collet (2013), judging by the pricing of the legacy debts of the pre-unitary states, international investors remained skeptical about the credibility of the Italian union decades after 1861.

However, I would tentatively argue that the existing literature can be reconciled with an homogeneous external pricing of the Lira. The latter can simply be a consequence of the spread of the Banca Nazionale[13] to the annexed provinces, guaranteeing the external value of the Lira across the country. However, while the Lira becomes the only legal tender in 1863, pre-unitary metallic and paper money continued to circulate widely, particularly in the South, to the 1880s (De Mattia, 1959). It is therefore important to note that the post-1863 homogeneous pricing of the Lira in my

[12] I estimate whether those effects materialized in the Italian case in separate work Vicquéry (2017)

[13] The former Piedmontese bank of issue which will continue to co-exist with other minor banks of issue until the creation of the Banca d'Italia in 1893.

data hides a significant degree of monetary fragmentation, as the Lira was not the only currency circulating internally until the 1880s. It would be then incorrect to consider the Lira quotes in the different Italian financial centers as reflective of local money market conditions after 1863. This is why the analysis in Section 4.1 only focuses on Italy as a whole (proxied by the London quote on Genoa) from 1863 onward.

Table 2: Coefficient of Correlation of Foreign-Exchange Bills Weekly Returns Between Pairs of Italian Financial Centers Before and After Unification

Naples and Sicily[a]	Piedmont and Tuscany	Piedmont and Naples	Piedmont and Sicily[a]
From 1852 to Invasion[b]or Piedmontese Administration[c]			
0.48	0.45	-0.31	-0.25
From Invasion[b]or Piedmontese Administration[c]to Annexation[d]			
0.78	0.44	-0.32	-0.66
From Annexation[d]to Monetary Unification[e]			
0.54	0.50	-0.45	-0.45
From Monetary Unification[e]to Inconvertibility[f]			
0.96	0.75	0.98	0.97
From Inconvertibility[f]to December 1869			
0.98	0.97	0.99	0.99

[a] Simple average of Palermo and Messina.
[b] 11th of May 1860 for Sicily, 19th of August 1860 for the continental South. The former date is used for the Naples and Sicily correlation.
[c] Tuscany comes under Piedmontese administration from the 27th of April 1859.
[d] Formal annexation following a plebiscite on the 11th of March 1860 for Tuscany and the 21st of October 1860 for the South.
[e] The Lira becomes the national currency on the 1st of January 1863.
[f] Inconvertibility of the Lira declared on the 1st of May 1866.

4. Econometric Analysis

In this section, I present the results of my econometric analysis, divided in two parts. First, I estimate Optimal Monetary Boundaries across Europe between 1848 and 1870, complementing my measure of symmetry of shocks with cluster analysis (Section 4.1). Second, I turn to the endogenous effects of monetary integration, testing whether Krugman-type integration-induced specialization patterns can be detected in the four decades following the Italian unification (Section 4.2).

4.1. Estimating Europe's Optimal Monetary Boundaries before 1870

4.1.1. Empirical Strategy

Both the debate on endogeneity and the somewhat contradictory character of some of the OCA criteria have made it difficult to provide a simple test for the optimal boundaries of currency area, pointing to a problem of inconclusiveness of the OCA framework (Tavlas, 1993). Nevertheless, while the empirical literature on currency areas has mainly focused its attention on the trade effect of common currencies, a number of methodologies have been employed to test for other OCA properties[14].

In this study, I follow the literature in focusing on the similarity of shocks as a "catch all" OCA property capturing the interaction between several properties (Mongelli, 2008). The key intuition behind this strand of the literature, initiated by Eichengreen (1991), is that similarity in supply and demand shocks with respect to some partners reduce the cost of giving up policy autonomy and improve the cost benefit analysis of forming a currency area with those partners.

I also heavily borrow from the "anchor-client" approach to monetary integration of Alesina et al. (2002) (See Section 2.1), who tested the potential of monetary integration across the globe with respect to key anchor currencies, looking at the symmetry of the business cycle between "candidate" countries and several anchor countries. I notably argue that monetary integration in the pre-Gold Standard period, similarly to most recent monetary unions, involved an anchor-client relationship. Possible anchor countries are assumed to be Britain and France (Section 2.2 summarizes their role in the pre-Gold Standard monetary system).

Given the lack of business cycle data for my period of interest, I use an alternative proxy for the cost of giving up policy autonomy, inspired by Bayoumi and Eichengreen (1997), who use nominal bilateral exchange rate variability. They intuitively argue that the costs stemming from fixing the exchange rate are best approximated by the ex-ante variability of this same exchange rate with respect to potential currency union partners.

[14] See Silva and Tenreyro (2010) for a discussion.

My empirical operationalization of the ex-ante costs to monetary union in the pre-Gold Standard historical context can therefore be summarized as follows. I assume that monetary independence as well as cyclical synchronization with respect to anchor countries can be proxied by the co-movements in foreign exchange bills returns on various European regions with respect to those same anchor currencies. The higher the dominance is, the lower the costs of monetary integration are, given that shocks are synchronized and monetary independence is already low. Therefore, an OCA can be proxied as an area composed of regions with similar dominance with respect to the same anchor(s).

In order to estimate monetary dominance I employ the Frankel-Wei framework (Frankel and Wei, 1994), which has long been used to investigate de-facto exchange rate regimes, infer implicit peg weights but also the relative strength of global anchor currencies (Bénassy-Quéré, 1999; Frankel and Wei, 2008). On the latter point, recent works (Subramanian and Kessler, 2013; Fratzscher and Mehl, 2014; Shu et al., 2015) have explored the rise of the Chinese reminbi as a global anchor currency, finding evidence of increased incentives in favor of monetary integration around China.

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

$$\Delta\, ln\, \frac{X_t}{Numéraire_t} = \alpha + \sum_i \beta_i\, \Delta\, ln\, \frac{Reference_{i,t}}{Numéraire_t} + \gamma_t' \mathbf{\Pi}_t + \epsilon_t \tag{1}$$

where the log of returns of the exchange rate of country X expressed in a numéraire currency at time t is regressed on the log of returns of the exchange rate of one or more reference currencies at time t, again expressed in terms of a common numéraire (typically the Swiss Franc or the SDR are employed); α is a constant allowing for trends in the returns of the left hand side currency over the period at hand, while $\mathbf{\Pi}$ is a vector of control variables and ϵ_t an error term. The β_is are the coefficients of interests as they represent each of the reference currencies weight (factor) in the unconditional movements of a currency of interest. It follows that if a currency of interest adhered to a perfectly stringent peg to the reference currencies on the right hand side of the equation the β_is factors would sum up to 1.

My baseline econometric specification is an adaptation of Fratzscher and Mehl (2014)'s global factor model of foreign exchange returns. I estimate the model for each of the financial centers included in my dataset[15], including a British Pound and a French Franc factors as well as a "regional" factor, all expressed in terms of Dutch Guilders, which I select as the numéraire currency. In its most complete form, the model reads:

$$\Delta e_t = \alpha + \beta_t^{GBP}\Delta e_t^{GBP} + \beta_t^{FFR}\Delta e_t^{FFR} + \beta_t^{REG}\Delta e_t^{\widehat{REG}} + \gamma_t BIDASK_t + \tag{2}$$
$$+ \delta_t^{BOE} BOE_t + \delta_t^{BDF} BDF_t + \epsilon_t$$

where e_t is the log of foreign-exchange bill returns on the financial center of interest against the Dutch Guilder in week t; α is a constant, capturing a possible drift in the returns; BIDASK is a control for market liquidity conditions, proxied by the average bid-ask spread observed in the London foreign-exchange bill market in week t; BOE and BDF control respectively for weekly changes in the Bank of England and the Banque de France's base rates (expressed in percentage points); finally, the superscripts GBP, FFR and REG denote the British, French and a regional factors, expressed in terms of returns against the Dutch Guilder[16]. The regional factor is constructed as the average of the foreign-exchange bills returns of a particular region, excluding the financial center of interest itself so that it is not on both sides of the equation[17].

A common problem of Frankel-Wei regressions is to ensure that the factors are exogenous to one another. Following again Fratzscher and Mehl (2014), I apply two identification assumptions which address this issue and allow for an easier interpretation of my factors' coefficient. First, I consider both the British and the French factors as exogenous, reflecting both countries' dominant role in the

[15] In a separate work I carry the estimate in panel setting to investigate the relative size of British and French monetary dominance over time Vicquery (2017).

[16] The quote is obviously the Paris one for the French Factor.

[17] I group financial centers in three regions based on both geography and the descriptive evidence collected in Section 3.2: a Western European region (Marseille, Anvers, Hamburg, Frankfurt and Berlin), a Southern-Central European one (Vienna, Trieste, Genoa, Leghorn as well as Naples, Palermo and Messina after 1863) and a Mediterranean-Peripheral one (Madrid, Cadiz, Lisbon, Oporto, Petersburg as well as Naples, Palermo and Messina until the end of 1862).

pre-Gold Standard European monetary system. Indeed, not only it would seem too conservative an assumption to consider the French factor to be endogenous to the British one[18], particularly given the leading role of French capital exports in the 1860s. To make such an assumption would also make my coefficient of interests less easily interpretable[19]. Second, I assume the regional factor to be endogenous to both the British and the French ones and we therefore derive it in two stages, first regressing it against the British and French factors,

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

and then plugging Equation 3's residual ω_t in Equation 2, as a proxy for the autonomous regional factor of financial centre t, where then

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

It is important to discuss the model's intuition. The estimated factor coefficients reflect[20] the degree of monetary policy autonomy enjoyed by the country of interest. As mentioned above, a perfectly inflexible exchange rate would translate into anchor currencies' factors summing up to 1 and to a perfect fit of the regression. Conversely, the lower the factor coefficients the higher the degree of monetary policy autonomy[21]. The magnitude of the coefficients can theoretically be influenced both by policy and economic "fundamentals". Obviously, it is hard to disentangle those two factors[22] as they are endogenous: if there is policy intervention, the authorities would indeed

[18] Reassuringly, running a Granger-causality tests does not suggest one-way causality between the two factors.

[19] Indeed, orthogonalizing the French factor with respect to the British one would imply that any collinearity between the two factors will be entirely attributed to the British factor.

[20] Depending on how free capital movements are, as monetary policy autonomy can be gained by imposing transaction costs on capital movements.

[21] But, as discussed in Section 2.1 in the context of the "German dominance" hypothesis debate, very few countries enjoy a truly independent monetary policy: the relevant question is towards which anchor country do they gravitate.

[22] This is sometimes achieved in the literature by controlling for foreign-exchange interventions and the degree of flexibility of the exchange regime (Subramanian and Kessler, 2013).

be wise to choose their peg basket based on fundamentals.

The economic intuition of the model is not fundamentally different when applied to the pre-Gold Standard historical context but a few qualifications apply. First, the dataset returns' refer to three months foreign-exchange bills rather than pure exchange rates. Foreign bills were the most widely used medium of international financial transactions throughout modern times, only starting to decline at the end of the 19th century (Denzel, 2010). A three months foreign-exchange bill sold in London would differ from, say, a forward three months exchange rate, in that it would involve an immediate down payment in London with the promise of receiving, in the foreign financial center, the local currency equivalent in three months time. Second, most currencies remain on a metallic standard throughout the period at hand. The credibility of the metallic anchor of each currency is therefore a key determinant of the bills' price behavior. If the currency is credibly convertible into a given metal and capital can freely flow, foreign exchange bills prices in London reflect the money market conditions of foreign centers and benefit from a self-stabilizing mechanism due to the intrinsic value of the currency. Indeed, movements in local demand for money would be followed by offsetting capital flows which would stabilize the bill price in line with the metallic anchor of the currency[23]. What we therefore observe, are nominal shocks that are able to affect bill prices within transaction costs "bands"[24]. Symmetry of nominal shocks would therefore translate into positive correlation of bill returns, while asymmetric shocks would yield negative correlation. Intuitively, a region highly integrated with respect to a given anchor country, would experience similar nominal shocks with respect to that anchor and high correlation in bills returns. It follows that my approach is consistent with the operationalization of the Optimum Currency Area framework around the concept of nominal exchange rate shocks variability first proposed by Bayoumi and Eichengreen (1997).

What if the monetary authorities choose (or were forced to) exert more monetary autonomy, by weakening the credibility of the metallic anchor, or even severing it altogether with a paper standard? Of course, "active" monetary policy within a largely metallic based monetary system

[23] As explained by Foreman-Peck (2005), a panic in say Palermo would trigger a sell-off of its bills, which will increase their returns and, as long as the faith in the metallic anchor is present, will encourage capital flows to benefit from higher yields.

[24] Indeed, the capital flows mentioned above would only kick-in once the return on the transaction approaches the cost of physically shipping metals across financial centers.

would translate into a much higher volatility for the affected currencies, making the estimation of the true factor coefficients harder. Nevertheless, to the extent that the relaxing of the metallic anchor means that market participants' expectations and fundamentals would play a larger role in driving fluctuations, the above intuition linking fundamentals to the symmetry of bills returns movements still holds.

To summarize, the factor coefficients, the βs estimated through Equation 2, represent the degree of synchronization between the anchor and the financial centers of interest. While policy choices might also impact the factor coefficients, I would argue that, particularly given the endogeneity issue between fundamentals and exchange rate regime choice highlighted above, synchronization of shocks with respect to anchor countries are the key driver of the factors I estimate.

I complement the above empirical strategy with clustering analysis[25], which provides an easier interpretation of my estimates of shock symmetry as well as a robustness test to the introduction of additional OCA-relevant variables.

Clustering analysis offers numerical methods to sequentially aggregate objects in groups according to a set of metrics (See Kaufman and Rousseeuw (2009)). Following Bénassy-Quéré and Coupet (2005)'s work on the African Franc Zone, I compute monetary cluster according to their "economic distance", calculated as the Euclidean distance between vectors characterizing each region or country. Cluster analysis is performed at the financial centers level using the British and French factor coefficients estimated in Section 4.1.2 and at the country level, including six variables for different sub-periods:

- *The British and French factor coefficients estimated in Section 4.1.2* (GBsym and FRsym) averaged at the country level, as a proxy for shock symmetry and the cost of forgoing independent monetary policy. Statistically insignificant coefficients are set to zero.
- *Share of British and French trade in total trade* (GBtrade and FRtrade), as a proxy of economic integration with respect to each anchor;

[25] A detailed discussion of the application of clustering techniques to the study of monetary areas can be found in Qureshi and Tsangarides (2006).

- *Log of total trade per capita* (OPEN) as a proxy for the level of economic openness, a key determinant of foreign exchange regime choice;
- *Government deficit* (DEFICIT), to capture monetary integration incentives related to debt service in hard currency or financing needs.

Robustness checks are carried testing different aggregation algorithms to compute similarity between objects and test the results' consistency to the use of Average, Centroid and Ward aggregation algorithms. I employ the Calinski-Harabasz Index to compute the optimal number of clusters in the sample.

4.1.2. Results

Table 6 shows the estimated British and French factors for all the financial centers in my sample across different sub-period[26]. It allows to analyze the shock synchronization experienced by regions that joined one of the monetary arrangements described arising in the period at hand. I will examine in turn the picture for the international gold standard, the Latin Monetary Union and, finally, Italy and Germany.

The financial centers that will ultimately join the gold standard show, with the exception of Portugal, similar levels of British and French dominance (the two Northern Italian financial centers also appear to belong to the same group until the start of Lira inconvertibility). This point to low costs of monetary integration for the gold standard core as well as some evidence on the predictive power of our framework. To a large extent, the results point to a bipolar European monetary core. The periphery experiences strong British monetary dominance: Austria-Hungary, Russia, as well as the Mediterranean regions in my sample exhibits a generally statistically significant British factor loading close to or even above 1.

From the above also follows that integration around the French Franc and the Latin Monetary Union would have made sense, from a symmetry of shocks point of view, for the European monetary

[26]The sub-periods are selected based on key events relevant to my framework: in 1852 the Second French Empire is created; 1858 marks the beginning of the Second Italian War of Independence; 1866 corresponds to a large scale financial crisis and to the Third Italian War of Independence, prompting Italy to declare the inconvertibility of its currency.

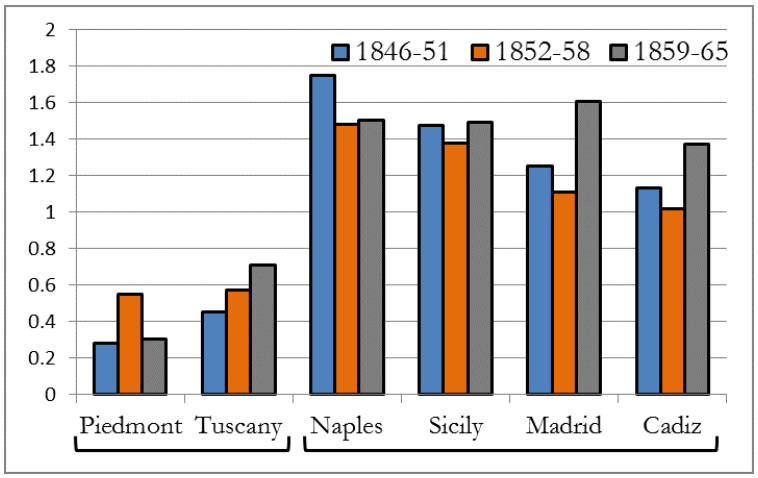
core only. Indeed, while Spain and, to some extent, Austria-Hungary made formal steps towards the adoption of a French bimetallic standard in order to benefit from French capital inflows (Flandreau, 2000), we are unable to detect any French monetary dominance on their financial centers.

The analysis of factor loadings for the Italian financial centers provides strikingly neat results, summarized in Figure 1. On the one hand, Northern financial centers in Piedmont and Tuscany show similar patterns of monetary dominance. On the other hand, we see the opposite picture when comparing the factor loadings of Northern and Southern Italian financial centers. Not only the magnitude of the British factor is very different, with much higher British dominance in Southern Italy alike other peripheral regions in Europe. The estimated coefficients for the French factor also implicitly show a high degree of negative correlation of the shocks experienced by the two regions. This points to unified Italy not being an OCA, judging by its regions' shock symmetry.

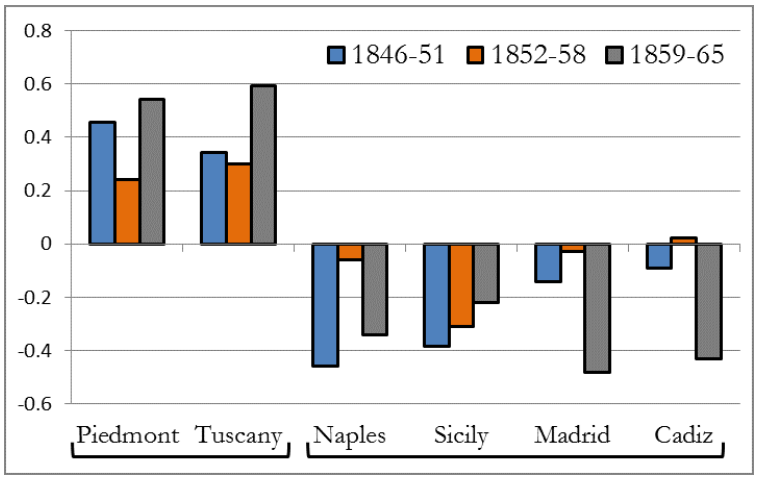
Figure 1 actually shows how the estimated monetary dependence *vis-à-vis* the two key anchor currencies indicate that Southern Italy and Spain were an order of magnitude closer to belonging to the same OCA than Northern and Southern Italy. This proximity deserves a closer look given the differing monetary policy paths took by Southern Italy and Spain following the Italian unification: I discuss this in Section 5.2.

Opposite to the Italian situation, years before monetary unification in 1871, German financial centers showed very similar anchor currencies' factor loadings (Figure 2). The estimated coefficients of interest roughly follow the same time pattern, with a relatively stable British factor and a French factor tripling in Frankfurt and doubling in Hamburg over the period. The relative magnitude of the two factors loadings varies at times substantially from one financial center to another but again with a common pattern. If the British factor dominates the French one until the beginning of the 1850s, all three German financial centers witness a higher French dominance ever after (albeit at different degrees).

Overall my results point to Germany being much closer to an OCA than Italy. Of course, ex-ante endogeneity plays a role in the German case as the German states had been integrating economically, and started to harmonize their monetary standards (Holtfrerich, 1993), since the beginning of the century. The behavior of the regional factor, which becomes statistically significant



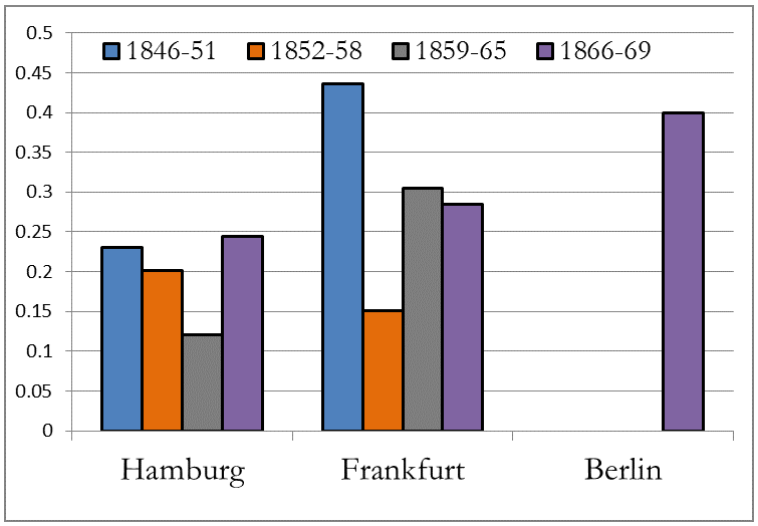
(a) British Factor Loading



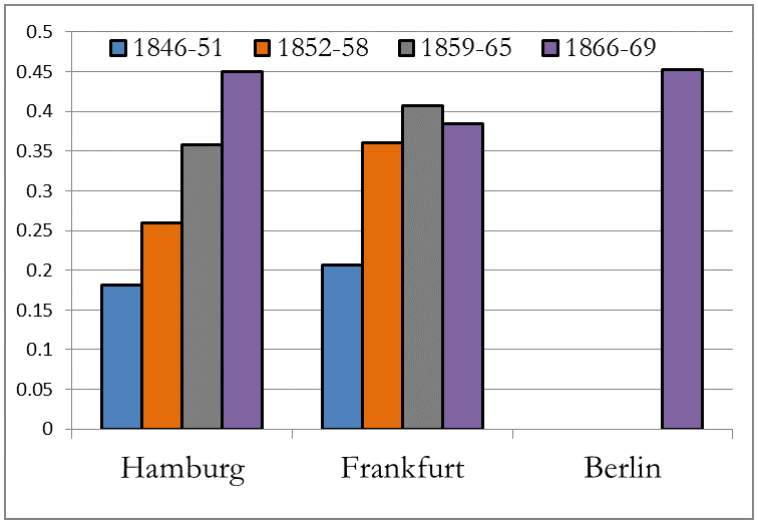
(b) French Factor Loading

Figure 1: Italy: High Macroeconomic Costs of North-South Monetary Integration

* Estimate ends in 1861 for Tuscany and 1863 for the Southern places, when they start to be quoted in Italian Lire. Sicily represents the simple average of the factor loadings estimated for Palermo and Messina.



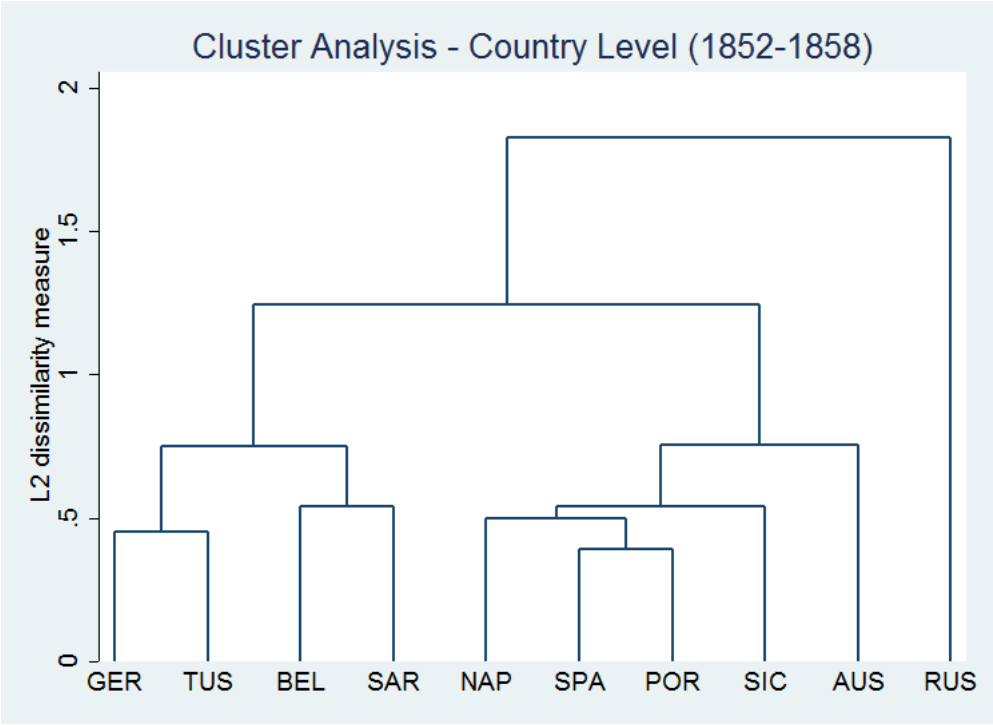
(a) British Factor Loading



(b) French Factor Loading

Figure 2: Germany: Low Macroeconomic Costs of Monetary Integration
Berlin's quote only available from 1866 onward.

Figure 3: Hierarchical Clustering at the Country Level



only at the very end of the considered period, however signals some regional idiosyncrasies, as the coefficient is negative for Frankfurt (-0.11) while positive and similar for Hamburg and Berlin (See Table 6).

I corroborate the above findings using cluster analysis. The latter is first performed on the coefficients estimated through Equation 2 at the financial center level. Figure 6 shows the clustering tree for two main sub-periods, before and after the Italian unification. The Italian financial centers pre-unification are once again shown to be part of different clusters. The North is clearly part of a "core" cluster alongside the German, Belgian and French financial centers. The South, on the other hand, belongs to a cluster of its own, but with high proximity to the Iberian and Austrian financial centers.

I check the robustness of the optimal monetary boundaries drawn using the asymmetry of shocks as a "catch all" OCA criteria, by adding several variables to the clustering analysis, now performed at the country level. Figure 3 shows how, once again, Italian pre-unitary states do not belong to the same monetary cluster immediately before unification. An HIC Test suggests the

sample should be divided in three clusters (Table 8). The first cluster, formed by Belgium, Piedmont-Sardinia, Tuscany and the Zollverein, is characterized by shock symmetry with respect to both Britain and France and high economic openness. The second cluster, formed by Austria, Naples, Portugal, Sicily and Spain shows on the other hand high shock symmetry and trade exposure to Britain, low shock symmetry and trade exposure to France and a low level of economic openness. Russia belongs to a third cluster as it is an outlier in both shock symmetry and economic openness. It is interesting to note that after 1858 the cluster membership remains the same, with unified Italy belonging to the same cluster as Belgium and Germany. However, the distance between the clusters' objects widens, as it can be seen looking at descriptive statistics in Table 8.

All in all, the first part of my empirical analysis has shown how ex-ante optimality was highly unlikely for the Italian monetary unification, while German financial centers experienced a degree of shock symmetry consistent with OCA.

4.2. Testing for the "Krugman View" on the Endogenous Effects of Monetary Integration

I now turn to the issue of the endogenous effects of monetary integration, focusing on the Italian unification[27] and the "Krugman view". Given the results outlined in Section 4.1 and the wide regional divergence observed post-unification it seems unlikely that OCA endogeneity mechanisms theorized by the "Commission View" had been at play in the post-unification Italian experience. Even though complete regional business cycle data are unavailable, Ciccarelli et al. (2010) find no evidence of regional cyclical convergence after unification looking at the construction sector. This section aims to provide empirical evidence on the possible causal link between monetary unification and regional divergence using Krugman's framework of specialization-induced divergence.

[27] I plan to include Germany in the analysis in a future version of the paper, subject to data availability.

4.2.1. Empirical Strategy

As described in Section 2.1, the framework developed by Krugman (2001) cautions against the endogenous effects of monetary integration. As the latter reduces transaction costs across regions, it might provide incentive for regional specialization, which would increase the likelihood of asymmetric shocks and increase the cost of forgoing an independent monetary policy.

I empirically test for this mechanism in the context of the Italian unification by computing an economic structure dissimilarity[28] measure for all possible pairs of 69 Italian provinces in census years. I then estimate the effect of economic and monetary integration on dissimilarity through a differences in differences approach. I exclude the agricultural sector from the analysis, given the extreme geographical concentration of industrialization in late 19th century Italy, and focus on dissimilarity across the industrial sector. If anything this should produce a bias against any positive findings in line with the Krugman view of integration induced specialization, as it looks at a much narrower scope for specialization. The treatment group is composed of pairs of provinces which were not part of the same polity[29] before unification: those are the pairs that should experience a new wave of specialization after unification. The pairs of provinces which were already part of the same polity before 1861 form the the control group. The process of national market integration in Italy is a slow one, as internal ways of transportation are non-existent at unification and are progressively built with a militiray, rather than commercial, rationale. (Federico, 2010) estimates that levels of national market integrations in line with those of other national markets are not to be felt before the 1880s, twenty years after unification. The same can be said for internal monetary integration (Toniolo et al., 2003). I therefore assume the "integration" treatment starts only in census year 1881[30]: indeed, according to the NEG framework, very low transactions costs are required for the endogenous effects described by Krugman to occur. The profile over time of the two treatment and control groups can be observed in Figure 4: dissimilarity in economic structure was higher across pre-unification borders from the start, but treated pairs experience a stark increase

[28] Measured with a Krugman Index (Krugman, 1991) for each pair of provinces across 15 industrial sectors using data from Ciccarelli and Fenoaltea (2013).

[29] I now consider all the pre-unitary Italian states: Piedmont-Sardinia, Lombardy-Venice, the Duchy of Parma, the Duchy of Modena, Tuscany, the Papal States and the Two Sicilies.

[30] Other census years are 1871, 1901 and 1911. No census was carried out in 1891.

in dissimilarity from the 1880s, compared to the control pairs.

In order to estimate the integration effect on regional economic structure dissimilarity I estimate a model of the type

$$k_{i,t} = \alpha + \beta D_{Integration_{i,t}} + \gamma' \mathbf{\Lambda}_{i,t} + \delta_i + \zeta_t + \theta_{s,t} + \epsilon_{i,t} \tag{5}$$

where $k_{i,t}$ is the log of the Krugman index for province pair i in census year t, $D_{Integration}$ is a treatment effect dummy, $\mathbf{\Lambda}_{i,t}$ is a vector of control variables and δ_i, ζ_t and $\theta_{s,t}$ are respectively a province pair fixed effect, a year fixed effect and a time-varying effect for every pre-unitary polity pair s. The latter is particularly important as the dynamic of agglomeration and specialization across province pairs within and between pre-unitary borders are likely to change dramatically before and after national economic integration gradually takes place. Agglomeration goes from an *ancien régime* pattern of concentration around the ancient capital to one where specialization takes place across the national market in line with endowments and comparative advantages (A'Hearn and Venables, 2011). I include as control variables the absolute difference between the province pair in literacy rate (LITERACY), population density (DENSITY), share of active population (ACTPOP), share of agricultural workers as a percentage of active population (AGRIPOP) and domestic market access (DMA)[31] to capture determinants of specialization that might occur regardless of economic and monetary integration.

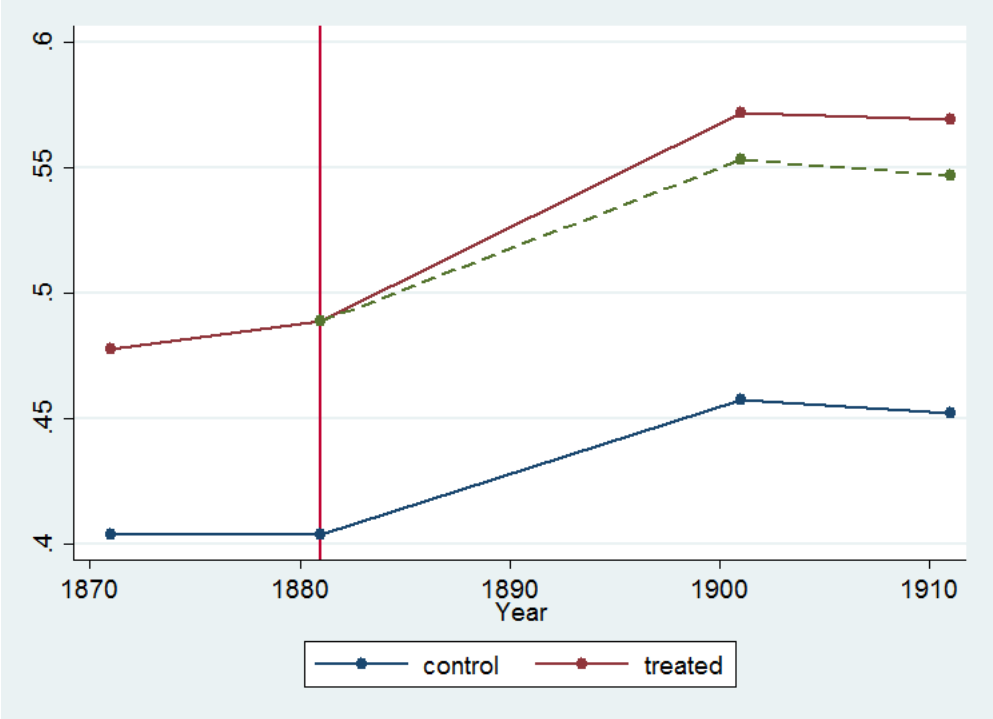
4.2.2. Results

As I cannot measure the change in the treatment intensity over the census years, I choose to estimate Equation 5 using the two extreme census years, 1871 and 1911[32]. The estimated effect of economic integration on regional economic structure dissimilarity is, as expected, significant and

[31] Measured as the sum of the population of all Italian provinces weighted by their distance from the centroid of the province of interest. The population of the province of interest is assigned an arbitrary weight of 30km.

[32] There is indeed a possibility that a weak treatment intensity was present already in 1881, while a high degree of market integration is commonly believed to be achieved in Italy by WW1 only.

Figure 4: Average Dissimilarity of Economic Structure Amongst Pairs of Italian Provinces
Treatment: Pairs of provinces that did not belong to the same polity pre-unification
Control: Pairs of provinces that did belong to the same polity pre-unification



positive (Table 3). Controlling for time-variant and invariant characteristics at the province pair level, as well as time-variant factors at the pre-unitary state pair level, I find integration to increase the Krugman index of dissimilarity by around 15% more in newly unified provinces compared to the control group.

As a robustness check, and also to provide more evidence regarding the fulfillment of the parallel trends assumption I run the diff-in-diff estimation with leads and lags of the treatment effect for the four census years[33]. As it is shown in Figure 7, no statistically significant difference can be found between the treatment and the control group in 1881. Additionally, I run cross-section versions of Equation 5. In columns (1) and (2) Table 9 I address a possible simultaneity bias between specialization and population movements by regressing the log of the Krugman indices in 1911 on 1871 levels of the controls. In columns (3) and (4) I use provide results from a first difference specification. The estimated effect of integration on dissimilarity is broadly in line with

[33]In other words, I add to Equation 5 an interaction between the treatment group indicator and year dummies for each of the census years except one.

Table 3: Integration Effect on Economic Structure Dissimilarity (Equation 5)

	(1)	(2)	(3)
D_Integration	**0.0263*****	**0.0291*****	**0.145*****
	(0.00522)	(0.00593)	(0.0228)
ACTPOP		0.000367	**0.000917****
		(0.000402)	(0.000376)
AGRIPOP		**0.00130*****	**0.00113*****
		(0.000196)	(0.000187)
LITERACY		**-0.000596****	**-0.00166*****
		(-0.000293)	(-0.000343)
DENSITY		0.0119	**0.0359*****
		(0.0145)	(0.0134)
DMA		-3.53E-05	**0.00178*****
		(-0.000491)	(0.000523)
1901	**0.0353*****	**0.0362*****	0.000475
	(0.0045)	(0.00471)	(0.00173)
Constant	**0.371*****	**0.354*****	**0.323*****
	(0.00115)	(0.0108)	(0.0155)
Fixed Effects	YES	YES	YES
Time Varying Polity Pair Effect	NO	NO	YES
Observations	4,692	4,692	4,692
Adj. R-squared	0.208	0.228	0.343

Notes: Robust standard errors clustered at the province pair level. ***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.

the differences-in-differences estimate.

All in all, the above results highlight how, in line with Krugman (2001), the reduction in transaction costs brought about by the economic and monetary unification of Italy induced an important wave of specialization across the pre-unitary borders. This further increased the already high dissimilarity in the economic structure of Italy's regions, endogenously boosting the risk of asymmetric shocks and therefore the costs of forgoing monetary independence. The possible implications for the economic history of the "Southern Question" are discussed in Section 5.2.

5. Implications

5.1. What lessons for the OCA framework?

A number of implications for the OCA framework can be drawn from the paper results on the endogeneity of the OCA criteria and the endogenous effects of monetary integration.

The paper confirms the OCA framework's predictive power, both in terms of membership and performance of currency areas. The optimal boundaries drawn by our measure of the costs of forgoing monetary independence in 1858 (Figure 6), coincide to a large extent to the endogenous monetary arrangements to be formalized in the subsequent years: the Latin Monetary Union, the gold standard and the German monetary union. The core members of the gold standard and the LMU are shown to be part of the same monetary cluster since the 1850s. The estimated OCA boundaries also tail well with the difficulty experienced by some countries, such as Spain and Austria-Hungary, in adhering to the standards of the LMU and the gold standard during the subsequent period, despite showing political will do to so.

The OCA framework is also shown to have some predictive power in terms of ex-post performance of currency areas. The exogenous formation of the Italian monetary union, despite the fact that its members clearly belonged to different monetary clusters, would point to high costs stemming from the establishment of a common currency. Comparing the evolution of regional divergence in Italy and Germany post-unification, one might speculate that the different ex-ante

costs of monetary integration might have partially contributed to the ex-post difference in regional inequality. Nevertheless, it is important to distinguish between predictive power in the optimality and the sustainability of currency arrangements. While the Italian monetary union was likely sub-optimal at unification, and to many extents it might still remains so, it has long outlasted the "optimal" 19th century supranational arrangements object of the study. This points to political integration and will as key determinants of currency areas sustainability (Bordo and Jonung, 1999), as opposed to optimality.

It follows that the mechanisms of OCA endogeneity highlighted by Frankel and Rose (1998) do not seem to play an important role in the monetary integration experience of the 19th century. The paper therefore tries to explore whether other types of endogenous mechanisms were at play. In particular, it shows that pairs of Italian regions that became integrated following the unification became much more dissimilar to one another compared to pairs of regions that already shared a common currency and market. This confirms Krugman (2001)'s worries regarding the adverse endogenous effects of monetary integration. It also cautions against the prevalent consensus that see OCA endogeneity effects to dominate over the "Krugman view" effects. Evidence on OCA endogeneity is indeed largely drawn from either large cross-sections of countries with different degrees of trade and monetary integration intensity or the relatively short lived experience of the EMU. This is problematic as the "Krugman view" effects might materialize only at very low levels of transactions cost, in line with those of a "national" market, something that the EMU is probably only now slowly approaching. This might be of particular concern for the EMU. While not all integrated markets are subject to persisting regional divergence, the role of asymmetric shock induced hysteresis on the location of the factor of production within currency areas should receive further research attention.

5.2. The Italian Southern Question through the prism of the OCA literature

The paper provides a new perspectives on two issues at the core of the economic history of the Italian "Southern Question": the relative conditions of the Italian regions pre-unification and the causes of regional divergence post-unification.

The paper clearly shows how the North and the South were part of two different monetary clusters prior to the unification. A fierce debate has opposed Italian economic historians on whether GDP per capita across the peninsula was relatively uniform at unification (Malanima and Daniele, 2007) or, on the contrary, the South was already lagging behind (Felice, 2013) in 1861. The paper's findings might be interpreted as indirectly supporting the second thesis. Indeed, judging by the levels of monetary independence and the symmetry of shocks, the South seems to belong to the poorer European periphery (together with Spain, Portugal and Austria), while the North seems to be part of the core. Nevertheless, this could reflect potential for growth rather than an already realized level of economic development. Further analyses of the data collected for this paper might provide more clear answers. As an example, the high volatility of the Southern currency in London during the 1850s (with large deviations from metallic parity) is hard to reconcile with the prudent fiscal policy of the Kingdom of the Two Sicilies. It might then reflect episodes of economic turbulences experienced by the Southern economy that are still to be assessed in the context of the Southern Question debate.

More importantly, the paper makes the case that the economic and monetary integration of Italy *in itself* might have contributed to the arising of the Southern Question. The argument goes behind the important points classically raised by the New Economic Geography framework and recently put forward in the Italian unification context by Basile et al. (2015) and Missiaia (2016). Of course, spatial agglomeration and economies of scale are a major explanatory factor for the Italian regional divergence experience. Nevertheless, there is a more subtle point to be made, looking at the interaction between supply and demand shocks and the concept of hysteresis (Blanchard and Summers, 1987). The latter has long been underlined as a key stylized fact of regional business cycles compared to national ones (Blanchard et al., 1992). To the extent that regions do not possess macroeconomic adjustment tools and factors are mobile within the national markets, regional business cycles could be characterized as stochastic processes. When idiosyncratic demand shocks adversely impact a region's production mix, factors of production migrate out of the affected region, preventing the adjustment mechanisms that would see the regions acquiring new specialties to take hold. In other words, temporary demand shocks might well turn into permanent supply potential losses.

This framework might for example fit with the experience of the Italian agricultural South in the latter part of the 19th century. By the 1880s, the national market was increasingly integrated, with high factor mobility within Italy, as well as internationally. Within the same time frame, grain imports competition from the New World brought about a severe deflationary shock for European agriculture. Against this backdrop it is interesting to compare the dynamics of the Italian South to that of Spain. While the Two Sicilies and Spain were part of the same monetary cluster pre-unification (Figure 1), their exchange rate policies diverged markedly following the Italian unification. The unified Kingdom of Italy, inheriting the high war debts of Piedmont, had to pursue widespread monetization, resulting in higher inflation than its partners, as well as a "gold shadowing" policy (Tattara, 2003) aimed at maintaining access to foreign financial markets (most of the debt was to paid back in hard currency to foreign investors). This combination resulted in a substantial real appreciation of the Italian Lira, in the order of 30% from unification to WWI (Ciocca and Ulizzi, 1990), which is likely to have significantly magnified negative terms of trade shocks for the agricultural South in the context of the international agrarian crisis of the 1880s and 1890s. On the contrary, the Spanish Peseta depreciated massively starting from the 1880s, cushioning the terms of trade shock to agricultural prices.

How then did Southern Italy adjust to this terms of trade shock? Migration clearly was a key channel of external adjustment in the Gold Standard period, and the New World "grain invasion" indeed coincides with the beginning of the mass migration phenomenon in Italy. Interestingly, Sánchez-Alonso (2000) estimates that without the devaluation of the Peseta, migration from Spain would have been up to 40% higher during the 1890s, in line with the Italian levels of the period. In other words, Spain provides a good counter-factual of what kind of exchange rate policy an independent Italian South might have pursued during the 1880s and 1990s. In the absence of macroeconomic adjustment tools to face a large asymmetric demand shock, factors of production left the South possibly leaving a permanent "scar" on its growth potential.

Even though it is likely that traditional NEG mechanisms had a larger role in the regional divergence dynamics of Italy, asymmetric shock induced hysteresis might also have contributed to the arising of a sizable North-South regional divide by the beginning of WW1.

6. Conclusion

In this paper, I have empirically analyzed the patterns of European monetary integration occurring in the third quarter of the 19th century, focusing on the Italian and German unifications. Using a modified Frankel-Wei model of global foreign-exchange co-movements, as well as clustering analysis, I have estimated Europe's optimal monetary boundaries at the eve of the gold standard era.

Overall, my findings confirm the predictive power of the OCA framework, both in terms of currency areas membership and ex-post performance. The optimal monetary boundaries I estimate in the 1850s, broadly predict the members of the 1870s gold standard core. I also show the costs of monetary integration for Italian regions to be far higher than the ones for German regions, as North and Southern Italy clearly belonged to different monetary clusters. This fits well with the ex-post performance of Italy and Germany in terms of regional divergence in the first decades of unification and to this day. On the other hand, my findings confirm the importance of distinguishing between OCA predictive power in optimality vs. sustainability of currency areas. Indeed, the Italian monetary union has managed to persist for one and a half century, despite persisting divergence, highlighting the role of political integration as the ultimate determinant of sustainability of currency areas.

I argue that the costs of monetary integration I estimated might have contributed to the arising of the Italian "Southern Question". The Italian experience seems to fit well with the "Krugman view" on the endogenous effects of monetary integration. The latter is believed to induce specialization, increasing the likelihood of asymmetric shocks and the costs of forgoing independent monetary policy. I show empirically that Italian provinces across pre-unitary borders experienced a surge in dissimilarity once national market integration kicked in. I also provide a narrative of how, in line with Krugman (2001), the large asymmetric shock experienced by the Southern provinces in the 1880s could have translated into an hysteresis effect on the Southern growth potential.

All in all, the historical experience of two large national monetary unions cautions against the

OCA endogeneity mechanisms theorized by Frankel and Rose (1998). The predictive power of the OCA framework in the context of a number of international monetary arrangements arising in the 19th century does not suggest that "it is more likely for a currency area to be optimal ex-post than ex-ante". Evidence in favor of OCA endogeneity is typically obtained looking at monetary arrangements that do not entail reductions in transactions costs and levels of factor mobility in line with a "national" markets, despite the fact that those are important conditions for Krugman-view effects to materialize. As the EMU moves towards further integration and boosting intra-EMU factor mobility is often indicated as an important tool to ease external adjustment for members, the paper's findings suggest that more attention should be paid to the adverse endogenous effects of monetary integration on cyclical synchronization.

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A. Appendix

Table 4: Standard Deviation of Weekly Foreign-Exchange Bills Returns Quoted in London by Monetary Standard (1852-1858)

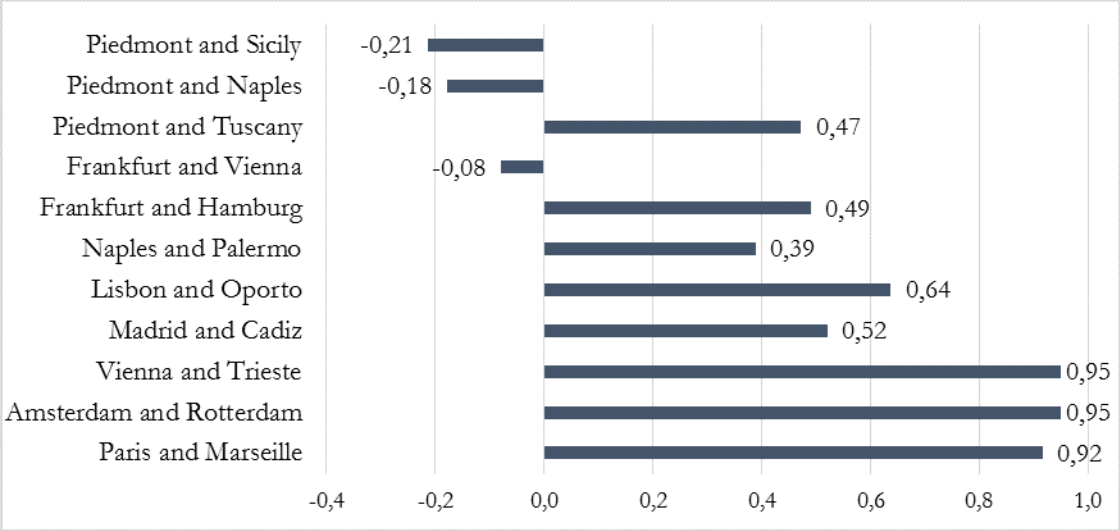
Gold		Silver		Bimetallic		Paper	
Oporto	0.16%	Amsterdam	0.15%	Anvers	0.13%	Vienna	1.26%
Lisbon	0.20%	Leghorn	0.17%	Genoa	0.13%	Trieste	1.41%
		Frankfurt	0.18%	Marseille	0.14%	Petersburg	1.64%
		Hamburg	0.22%	Paris	0.14%		
		Cadiz	0.26%				
		Messina	0.28%				
		Palermo	0.28%				
		Madrid	0.29%				
		Naples	0.44%				

Table 5: 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.*

Figure 5: Coefficient of Correlation of Foreign-Exchange Bills Weekly Returns Between Selected European Financial Centers (1852-1869)*



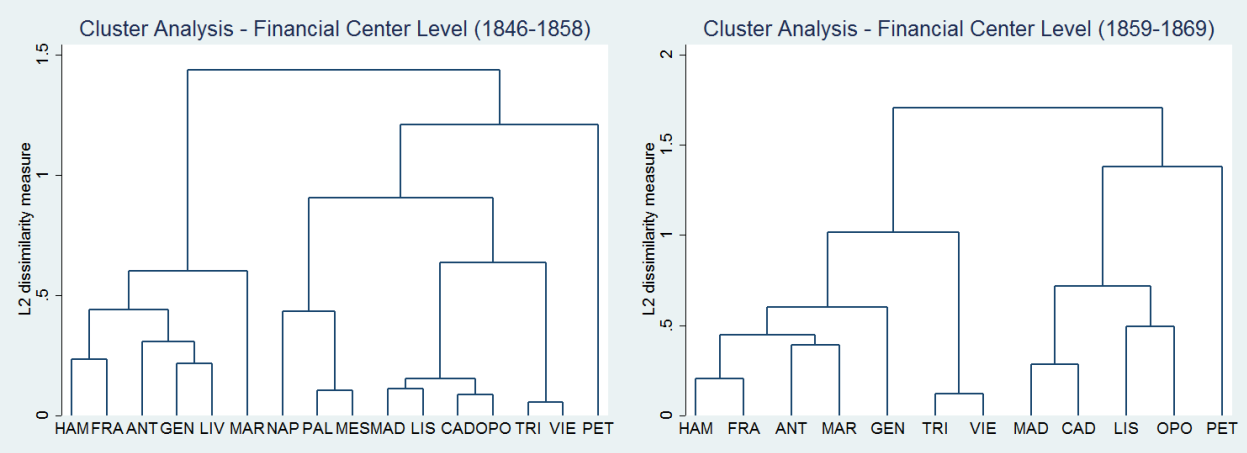
*1852-1858 for Italian financial centers

Table 6: Equation 2 Estimated Individually for Each Financial Center (Part 1)
Robust standard errors not reported. ***, ** and * denote statistical signficance at the 1%, 5% and 10% respectively.

	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****

Table 7: Equation 2 Estimated Individually for Each Financial Center (Part 2)
Robust standard errors not reported. ***, ** and * denote statistical signficance at the 1%, 5% and 10% respectively.

	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



(a) 1846-1858

(b) 1859-1869

Figure 6: Hierarchical Clustering at the Financial Center Level

Table 8: Hierarchical Clustering at the Country Level - Descriptive Statistics by Cluster
Average (Standard Deviation)
Optimal Grouping Suggested by HIC Test

Panel A: 1852-1858

Cluster	Members	GBsym	FRsym	GBtrade	FRtrade	OPEN	DEFICIT
C1	Belgium, Sardinia, Tuscany, Zollverein	0.41 (0.16)	0.31 (0.05)	0.18 (0.06)	0.29 (0.19)	1.16 (0.30)	1.15 (0.12)
C2	Austria, Naples, Portugal, Sicily, Spain	1.15 (0.28)	-0.06 (0.12)	0.30 (0.13)	0.18 (0.11)	0.40 (0.14)	1.14 (0.13)
C3	Russia	1.92 -	0.00 -	0.31 -	0.08 -	-0.47 -	1.79 -

Panel B: 1859-1869

Cluster	Members	GBsym	FRsym	GBtrade	FRtrade	OPEN	DEFICIT
C1	Belgium, Italy, Zollverein	0.29 (0.23)	0.23 (0.18)	0.18 (0.028)	0.28 (0.15)	1.52 (0.50)	1.26 (0.26)
C2	Austria, Portugal, Spain	1.20 (0.16)	-0.13 (0.18)	0.26 (0.13)	0.14 (0.09)	0.63 (0.07)	1.40 (0.15)
C3	Russia	0.00 -	0.00 -	0.25 -	0.09 -	-0.29 -	1.24 -

Figure 7: Estimated Leads and Lags of the Treatment Effect

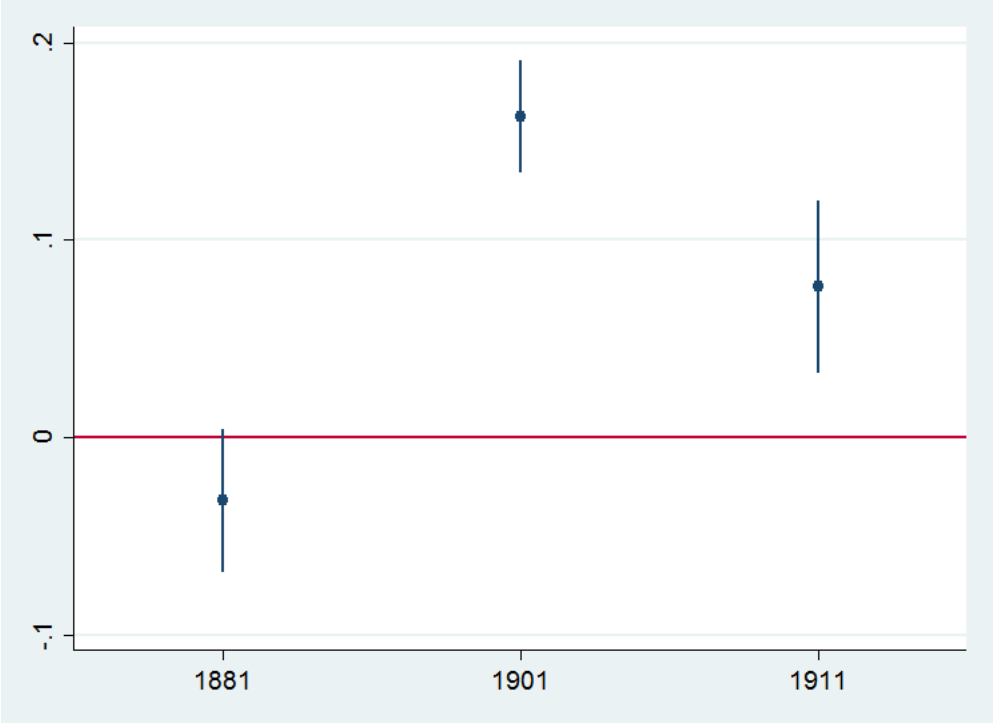


Table 9: Further Krugman Index Regressions

	Log of Krugman Index		First Difference of the Krugman Index	
	(1)	(2)	(3)	(4)
D_Integration	**0.0698*****	**0.0755*****	**0.0373*****	**0.119*****
	(0.00801)	(0.0283)	(0.00813)	(0.0167)
distance	**-1.03e-07*****	**1.41e-07*****		
	(1.89e-08)	(4.07e-08)		
capital_both	**-0.0622*****	**-0.0889*****		
	(0.0126)	(0.0197)		
island_one	**0.0880*****	**0.111*****		
	(0.00969)	(0.0159)		
ACTPOP71	**-0.00184*****	**-0.00157****		
	(0.000484)	(0.000735)		
AGRIPOP71	0.000112	**-0.00110*****		
	(0.000272)	(0.000395)		
LITERACY71	**0.00293*****	**0.00308*****		
	(0.000249)	(0.000465)		
DENSITY71	**0.0385*****	**0.0479*****		
	(0.00567)	(0.00830)		
DMA71	**0.00389***	-0.00140		
	(0.00215)	(0.00356)		
d_ACTPOP			**0.00166*****	**0.00189*****
			(0.000642)	(0.000590)
d_AGRIPOP			**0.00174*****	**0.00155*****
			(0.000320)	(0.000307)
d_LITERACY			0.000453	4.62e-05
			(0.000300)	(0.000298)
d_DENSITY			**-0.103*****	**-0.0642*****
			(0.0260)	(0.0244)
d_DMA			-0.000390	**0.00501*****
			(0.00162)	(0.00177)
Constant	**0.326*****	**0.438*****	**0.0582*****	**0.0581*****
	(0.00841)	(0.0198)	(0.00663)	(0.0123)
Polity-Pair Fixed Effect	NO	YES	NO	YES
Observations	2,346	2,346	2,346	2,346
R-squared	0.164	0.259	0.031	0.162

Notes: Robust standard errors in parentheses.
***, ** and * denote statistical significance at the 1%, 5% and 10% level respectively.