CURRENCY UNIONS
AND HETEROGENEOUS TRADE
EFFECTS: THE CASE OF THE LATIN
MONETARY UNION

Jacopo Timini

2017

BANCO DE **ESPAÑA**

Eurosistema

CURRENCY UNIONS AND HETEROGENEOUS TRADE EFFECTS:
THE CASE OF THE LATIN MONETARY UNION

CURRENCY UNIONS AND HETEROGENEOUS TRADE EFFECTS: THE CASE OF THE LATIN MONETARY UNION

Jacopo Timini [(*)]

BANCO DE ESPAÑA

Abstract

The Latin Monetary Union (LMU) agreement signed in December 1865 by France, Italy, Belgium and Switzerland standardised gold and silver coinage in member countries and allowed free circulation of national coins in the Union. In his seminal study, Flandreau (2000) found no evidence of an overall positive effect of the LMU on trade. In this paper, I estimate the effects of this currency agreement on trade. In my gravity model I explicitly take into account the changing conditions in the international environment that affected the LMU's underlying economic foundations (i.e. the limits on silver coinage agreed upon in 1874) and its rules (i.e. the "liquidation clause" of 1885). I also test the existence of heterogeneous effects on bilateral trade within the LMU. In line with Flandreau, I find no significant LMU trade effects. However, I find support for the hypothesis that the LMU had significant trade effects for the period 1865-1874. These effects were nonetheless concentrated in trade flows between France and the rest of the LMU members, following a *hub-and-spokes* structure. Moreover, I find evidence for the existence of an 1874 "LMU-wide" structural break, which affected the course of trade flows within the Union.

Keywords: international trade, currency unions, Latin Monetary Union, gravity model, bimetallism.

JEL classification: F45, N73.

Resumen

El acuerdo de la Unión Monetaria Latina (UML), firmado en diciembre de 1865 por Francia, Italia, Bélgica y Suiza, estandarizó la acuñación de monedas de oro y plata en los países miembros y permitió la libre circulación de las monedas nacionales en la Unión. En un influyente estudio, Flandreau (2000) no encontró evidencia de un efecto positivo general de la UML sobre el comercio. En este trabajo se estiman los efectos de este acuerdo monetario sobre el comercio utilizando un modelo de gravedad, que tiene en cuenta, de forma explícita, las condiciones cambiantes en el entorno internacional que afectaron a los fundamentos económicos subyacentes a la UML (es decir, los límites a la acuñación de las monedas de plata en 1874) y sus disposiciones (es decir, la «cláusula de liquidación» de 1885). En este marco, el estudio prueba la existencia de efectos heterogéneos sobre el comercio bilateral dentro de la UML. En línea con Flandreau, no se encuentra un efecto significativo de la UML sobre el comercio. Sin embargo, la evidencia presentada apoya la hipótesis de que la UML tuvo efectos significativos sobre el comercio en el período 1865-1874. Estos efectos, no obstante, se concentraron en los flujos comerciales entre Francia y el resto de los miembros de la UML, siguiendo una estructura *hub-and-spokes*. Además, se encuentra evidencia de la existencia de una ruptura estructural a nivel de UML en 1874, que afectó a la evolución de los flujos comerciales dentro de la Unión.

Palabras clave: comercio internacional, uniones monetarias, Unión Monetaria Latina, modelos de gravedad, bimetalismo.

Códigos JEL: F45, N73.

I. Introduction

Did the Latin Monetary Union (LMU) generate significant effects on trade? And, were these effects, if any, homogenously or heterogeneously distributed across members?

Despite the LMU lasted more than 6 decades (1865-1927), between the 19th and the 20th century, only few contemporary economic historians put this international agreement at the centre of their research (Flandreau, 2000; Flandreau and Mauriel, 2005; Einaudi, 1997, 2000 and 2001).

This monetary convention signed in 1865 by Belgium, France, Italy and Switzerland (later joined by Greece in 1868), aimed to introduce a harmonised framework – agreed by intergovernmental procedures – for the coinage and exchange of specie, i.e. to create a common currency standard. The agreement was parsimonious, devising a basic set of rules associated with very light enforcement. In the absence of a supranational structure, the delegated powers, the practical implementation, and the ordinary functioning of the Union were delegated to national institutions. The latter, subjected to legal arrangements whose loopholes left them ample room of manoeuvre, could favour or hinder the process of both monetary and trade integration. For example, they could restrict de facto the acceptance and convertibility of foreign coins in the domestic banking system, and possibly use different standards depending on the country of origin, thus generating heterogeneous effects.

Following recent methodological updates (i.e. Baier and Bergstrand, 2007, Glick and Rose, 2016), and adapting them to a reality of "comprehensive importance"[1] such as the LMU, I use a recently published database (RICardo) on international trade in historical perspective, and an innovative approach (Gowa and Hicks, 2013) to identify "within"-Union trade effects. This allows for the existence of heterogeneous effects on trade flows, which may have occurred for a number of reason, ranging from the structure of trade itself to finance and politics.

Using, first, a gravity model and, second, structural break analysis, on one hand I confirm the results of the pioneering work of Flandreau (2000), who found an insignificant effect of the LMU on overall within-Union trade. On the other hand, I explicitly consider factors related to the changing conditions in the international environment affecting the LMU underlying economic foundations (i.e. the limits on silver coinage established in 1874) and the rules of the Union (i.e. the new terms for coin redemption agreed in the "liquidation clause" of 1885). In these cases, the data support the hypothesis that the LMU had significant trade effects for the period 1865-1874. These effects were nonetheless concentrated in the flows between France and the rest of LMU members. Finally, I confirm that only in 1874 (and not in 1885) there was a "LMU-wide" structural break, which affected the evolution of trade flows within the Union.

The paper is organised as follows: Section II provides a brief literature review, trying to build bridges between monetary unions and trade within a hub-and-spokes perspective. Section III details a short history of the LMU, with particular attention to the decline of bimetallism and the "liquidation clause". Section IV discusses the methodological approach, mainly dealing with issues inherent to gravity

---

[1] In his encyclopaedic work "A History of Banking in all the leading nations" (1896), Sumner decides to devote an entire chapter to the LMU despite framing its analysis within national boundaries otherwise. This is due to the belief of the author that "the Monetary Union which since 1865 has bound France to Belgium, Switzerland, Italy and Greece is of […] comprehensive importance in its bearings upon the coin and auxiliary circulations of the allied countries" (Sumner, 1896, Vol.3, p.345).

models, and describes the RICardo database.[2] Section V discusses the results, and provides a new interpretation of the Union's trade effects within a hub-and-spokes framework. Section VI summarises and concludes.

II.   Literature review

Theoretical contributions on regional monetary integration date back to Mundell's (1961) seminal paper on optimum currency areas. However it was only in the wake of the EMU, that the debate gained definitely momentum. The European Commission (1990) released a comprehensive report in support of the process of integration, providing an in-depth cost-benefit analysis on the consequences of a currency union.[3] Recently, De Grauwe (2014) and Krugman (2013) offered clear updates on the advantages and disadvantages associated to a currency union.[4] On the other side, the empirical literature reached its height at the dawn of the Euro,[5] when Rose (2000) obtained impressively large positive effects of the use of a common currency on bilateral trade flows (+>200%).[6] Rose's paper prepared the ground for the debate on the possible effects of the Euro, and served as a catalyst for fostering research in this domain. Successive studies critically looked to the exceptional magnitude of Rose's initial estimations.[7] Baldwin (2006) and Baldwin and Taglioni (2006) provide extensive and lively literature reviews of this debate, highlighting some errors that may affect not only Rose's results, but a large part of the following works based on gravity models: omitted variable bias; model mis-specification; and endongeneity[8] (see also Persson, 2001). Indeed, the consensus among scholars is that these issues should be fully taken into account in gravity models of bilateral trade to avoid biases in estimations (Flam and Nordström, 2006; Barro and Tenreyro, 2007; Baier and Bergstrand; 2007). In the literature, this is implemented mainly through the use (of different combinations) of country-pair and time effects, and favouring poisson or semi-poisson estimations (Santos Silva and Tenreyro, 2006) instead of OLS regressions.

Quantitative economic historians also looked with particular interest at trade related effects of different exchange rate regimes, being the gold standard the focus of the literature (Lampe and Sharp, 2014). Lopez-Cordova and Meissner (2003) investigated empirically the influence of the gold standard on bilateral trade flows. Their findings support the hypothesis that being on gold fostered commercial

---

[2] In a previous version of this paper we also used a reduced version of the Tena DB (Tena, forthcoming), with three year average trade flows.

[3] Despite the 2008 crisis unveiled a degree of "wishful thinking" (Krugman, 2013) – the piece in itself constitute an unprecedented effort assembling together contributions (347 pages in total) from eminent scholars and economists both from inside and outside the Commission. While acknowledging its limitations, we are convinced that it remains a valid reference.

[4] However, in the 19th century the state of knowledge and the level of sophistication regarding the economic consequences of currency union were extremely different, as exhaustively documented by Einaudi (2001) and Flandreau (2000, 2003), who adapted the debate to that historical reality.

[5] Rose decided to refer directly to the European Commission study (1990, op. cit.) in the title of his paper: "One Money, One Market: Estimating the Effect of Common Currencies on Trade".

[6] Even being completely aware of its criticism and further methodological improvements in the literature, Rose's paper (2000) remains "the most influential international economics paper" of its decade (Frankel, 2006, p.76).

[7] See Rose and van Wincoop, 2001; Glick and Rose, 2002; Micco et al., 2003; Rose and Stanley, 2004; Berger and Nitsch, 2005.

[8] Baldwin (2006), Baldwin and Taglioni (2006) and Baldwin et al. (2008) classified the errors following Olympics terminology, such as "Gold, Silver, and Bronze medal" mistakes, dealing with omitted variable bias, mis-specification, and time-related biases (i.e. the common use of the US price deflator).

relations significantly, and up to +30%. The gold standard era is also of interest for monetary and financial historians, as scholars aim to understand the political economy behind the decision of adhering or not. Bordo and Rockoff (1996), Flandreau et al. (1998), and Meissner (2005) are seminal contributions in this areas. However, this strand of literature will not be at the core of this study.[9] Flandreau (2000) represents a solid work on the effects of currency unions on trade with both a historical and an empirical approach, focussing on the Latin Monetary Union (LMU). Being published the same year of Rose's seminal paper, at that time the author could not be aware of the decade of fierce debates that would have followed. Flandreau's results derive from a standard gravity model, and uses OLS regressions for cross-sectional data, repeated for three benchmark periods (1860s, 1870s, 1880s).[10] The author identifies the LMU using a dummy variable "which takes the value one when both countries in a pair belong to the 1865 Convention and zero when otherwise" (Flandreau, 2000, p.29), concluding that the LMU did not introduce any considerable bias to bilateral trade, as its coefficient is not statistically significantly different from zero in any of the three regressions. Flandreau and Mauriel (2005) look more extensively to trade relations and business cycles correlations during the 19th century, taking as references the LMU, the Scandinavian Currency Union (SCU)[11] and the Austro-Hungarian currency union. As in Flandreau (2000), the LMU is found having no influence on its members' bilateral trade.

However, the literature inspired by Rose's study does not investigate how further economic integration on a regional basis, such as in the LMU case, may influence "within" and "external" trade flows. Egger and Pfaffermayr (2013) are an exception. Their empirical work aimed at identifying differences across intra-EU trade related to the process of European integration, separating countries on the basis of the duration of their membership, but neglected political and economic factors. In this respect, Baldwin (1994, 2006, 2008) advances the hypothesis of "hub-and-spoke" integration, where few leading nations (the "hubs") are better placed to generate interconnections with the other members (the "spokes"). Following Baldwin's arguments, these developments may be due either to the construction of a bilateral preferential agreements network creating "artificial" relative advantages for the "hub(s)", or to the natural consequences of an underlying Heckscher-Ohlin type of trade involving exchanges of differentiate goods between hub and spokes. In addition to Baldwin's theory, Flandreau (2000) suggests a role for the indirect effects of "investing abroad" within an area that envisaged a degree of monetary integration.[12] From a theoretical perspective, Albertin (2008) builds a framework where gains – in terms of trade effects – are not equally distributed among members of the currency union and depend on some (economic) "dissimilarities" among countries. Those "dissimilarities" can constrain the size of the gains. From a completely different perspective – walking on a bridge between Marxism and more traditional theories of international relations – dependency theory can also provide theoretical grounds for differences between hub and spokes, due to economic and socio-political constraints and distortions. These issues however are not explored in this paper.[13]

The LMU institutional framework may have constituted a trade-enhancing environment through closer institutional relationships and an attempt of monetary harmonisation. However, as suggested by recent

---

[9] For a brief summary see Martin-Aceña, Martinez-Ruiz and Nogues-Marco (2011); for a comprehensive literature review see Morys (2011).

[10] A maximum of 30 observations per period.

[11] In his previous paper, Flandreau (2000) uses the SCU as a control variable.

[12] For further discussion on the incentives related to economic integration *sensu lato* and particularly related to the EU dimension, see Pelkmans and Brenton (1997). For a comprehensive discussion see Flandreau (2000).

[13] For a thorough analysis of what dependency theory is, see Duvall (1978).

trade theories, the LMU may not be a homogeneous construction that symmetrically shares benefits and costs among its partners, but a sum of entities diversely affected by the Union and its intergovernmental framework. For this reason, proxying the LMU with a single dummy could hide heterogeneous dynamics caused by a variety of reasons, from the institutional framework to the structure of trade.

The increasing availability of data, in parallel with several improvements in their treatment and estimations methods, constitute pivotal steps for the empirical literature dealing with currency unions and (bilateral) trade. In an historical context, two databases have been created recently, RICardo (for further information see Dedinger and Girard, 2016) and Tena DB (Tena, forthcoming). The possibility of exploiting these new sources and the application of up-to-date econometric techniques, may help to shed additional light on the LMU-related trade issues. The additional introduction of two separate dummies, for hub-and-spokes and spoke-to-spoke relationships, will allow to clarify "within" trade phenomena. Finally, part of the analysis will also be devoted to understand possible *beggar-thy-neighbor* effects, i.e. whether trade benefits were created at the expenses of non-member countries. To my knowledge there is no previous contribution on this issue for my period of reference, and it may also serve to check whether the results are compatible with the estimations of heterogeneous LMU effects.

III.   Historical background

The establishment of the LMU was not motivated exclusively by the French ambition to increase its political influence across Europe. It was also motivated by economic reasons (mainly related with the willingness of deepening trade relationships), as well as growing federative ideas and solidarity sentiments circulating throughout the continent (Flandreau, 2000; Einaudi; 2000). Those motivations were also highlighted by influential policy-makers of that time:

> "Back then in 1865, for a sentiment of federation and solidarity which prevailed in all economic relations in Europe [...] [and] that had to bind all people in currencies, exchanges, trade, common treaties, and for reasons of need, was established the monetary convention".[14]
>
> (Luzzatti, 1881)[15]

Indeed, the birth of the LMU came after a turbulent period for the majority of the European currencies – including those of the countries that will later join the LMU – partially related with the unexpected decline in the price of gold (Einaudi, 2007). The unilateral responses to the destabilizing effects of wide changes in the market bimetallic ratio often included modifications to the fineness of national silver coins, in an effort to reduce their intrinsic value and reinforce the legal bimetallic ratio(s). This was, for example, the case of Switzerland (1860) and Italy (1862). However, the lack of coordination fragmented the European monetary system, as the new fineness of silver coins were not homogenous across

---

[14] In Italian in the original: "Allora nel 1865, per un sentimento di federazione e di solidarietà che prevaleva in tutte le relazioni economiche dell'Europa […][e] che doveva avvincere tutti i popoli nelle monete, nei traffici, nei commerci, in trattati comuni, e per una ragione di necessità, fu stabilita la convenzione monetaria"

[15] Please refer to Appendix I for further explanations on the pivotal importance of Luzzatti in Italian politics, and with particular regards to trade, monetary and finance issues. Appendix I also provides extensive information on the relevance of his personal archive – preserved at the Istituto Veneto di Scienze, Lettere ed Arti in Venice – for this paper.

countries. Perhaps, the 1865 monetary agreement was seen by policy-makers as the silver bullet capable of removing "every impediment to free transaction among the inhabitants of the four [signatory] states, deriving from the different fineness of their silver divisional currency".[16] Indeed, their objective was to eliminate trade disruptions and speculations deriving from such monetary distortions. The transcriptions of the debate in the Italian Parliament on the day of the approval of the agreement support this view: "The silver coins fineness variance [across countries], apart from offering opportunities to private speculations, had as an effect the restriction of the currency tender within the borders of the country of origin, so it is easy to imagine the consequent perturbations on the exchanges with the neighbouring populations."[17]

However, since its creation, the LMU was a purely intergovernmental structure (see Appendix III for a complete chronology of LMU conferences and their main achievements),[18] which did not foresee any mechanisms or criteria clearly defining rights and obligations of the member states within the decision making process, consequently favouring international relations based on a hierarchical distribution of power (Fabbrini, 2015).[19] In addition, the LMU had to struggle for adapting with an ever-changing European and global economic situation. It underwent several structural reforms in a long-lasting fight for survival, which finally lost *de jure* in 1927. However, *de facto* its relevance started to fade away well before, already in the 1870s-1880s. In these two decades the LMU faced several challenges, but the historical literature usually highlight two major ones. The first was an external threat: bimetallism stability was declining and, contemporaneously, the gold standard was emerging as the overarching monetary reference (Flandreau and Oosterlinck, 2012; Meissner, 2005). The rise of the latter was neither inevitable nor happened abruptly, as it was the result of a combination of economic and political factors, deriving from the rivalry between Germany and France (Flandreau, 2003). Potentially, market expectations on the viability of silver as a fundamental part of a global bimetallic standard could have been intertwined to those on the future of the LMU and its institutional architecture, indirectly influencing trade. Markets change their views in 1874, following the French (late 1873) and LMU (early 1874) silver minting restrictions, with a gradual adjustment of their beliefs on the sustainability of the bimetallic standard throughout the year (Flandreau, 1996; Flandreau, 2003; Flandreau and Oosterlinck, 2012). The second was an internal challenge: the troubled revision of the treaty in 1885 – Belgium temporarily left the Union – ended with the introduction of a "liquidation clause" (Cottrell et al., 2007), the new Article XIV of the agreement. The provision foresaw that:

> "In case of the denunciation of this convention, each of the contracting states
> shall be bound to redeem the silver 5-franc pieces which it shall have issued, and

---

[16] In Italian in the original. See draft bill presented to the Italian Parliament for the approval of the LMU, 16 April 1866: "Signori! Il 23 dicembre 1865 è stata conchiusa e sottoscritta a Parigi fra i Governi d'Italia, Francia, Belgio e Svizzera una convenzione intesa a stabilire un mutuo accordo nella rispettiva legislazione monetaria e togliere ogni impedimento alle libere transazioni fra gli abitanti de' quattro Stati, derivante dal diverso titolo della loro moneta divisionaria dello scudo d'argento". Available at https://archivio.camera.it/.

[17] *Ibid*. In italian in the original: "Cotesta varietà di titolo negli spezzati dello scudo d'argento, a parte lo allettamento che offriva a profittevoli speculazioni private, ebbe necessariamente per effetto di restringere il corso delle stesse monete entro i confirni de' singoli stati d'origine, con quale perturbazione negli scambi delle popolazioni limitrofe è facile immaginare."

[18] In the course of its existence, LMU Member States organised 13 conferences for a varied set of purposes; more precisely in 1865 (founding convention), 1874, 1875, 1876, 1878, 1879, 1885, 1893, 1897, 1902, 1908, 1920 and 1921. In addition, International Monetary Conferences, where LMU members attended regularly, were held in 1867, 1878, 1881, and 1892. For further details, see De Cecco (1996).

[19] On the topic of intergovernmentalism and distribution of power, see Fabbrini (2015). To have an interdisciplinary overview on the consequences of an increased intergovernmentalism, see Adams, Fabbrini and Larouche (2016).

which shall be in the circulation or the public treasuries of the other states, by paying to those states a sum equal to the nominal value of the coins redeemed"

(LMU Convention, signed on 6 November 1885)

The international "liquidation of balances", i.e. the repatriation of the respective silver coins to other LMU members, was an inconvenience arising from the constant depreciation of silver (with respect to gold), and a particular concern for France, which "held much more coin issued form the Mints of Belgium and Switzerland, and to some extent Italy, than was held by these Governments of the French coins" (New York Times, 1885). The transformation fuelled through this channel was believed to be so important for the member states, that they decided to stipulate a special arrangement – delineating the details of its potential implementation – and appended it to the convention (De Cecco, 1996; Bae and Bailey, 2011). In Willis (1901, p.236) own words, "the ratification of the treaty of 1885 really meant the abrogation of the Latin Union and the substitution of a *new monetary league* in its place".[20] The change of the rules, and the new division of risks and responsibilities arising from it, could also have been a game changer in the domain of international trade, as it was hampering the easiness of moving coins across borders.

Therefore, changes in LMU's rules and institutions should be taken explicitly into account in the empirical analysis of trade determinants. Indeed, as stated by Gowa and Hicks (2013), "[p]olitically powerful states can create agreements and institutions and implement them using the rules of the game that have as their raison d'être the production of heterogeneous effects across their members." In the case of the LMU, the drivers that may have favoured the creation of heterogeneous effects could have been the following: 1) the relevance of national institutions in implementing the monetary agreement – for example the role of central banks[21] in providing facilities to favour (or halt) the procedures of exchanging coins, possibly discriminating by country of origin; 2) the changing "rules of the game" – i.a. the inclusion of the "liquidation clause", which in case of a dissolution of the Union, forced the return of divisionary (silver) coins to the respective countries of issue, in exchange of gold at its legal tender rate. Since Sumner (1896) and Willis (1901), the literature acknowledges the predominant role exerted by France within the LMU. Indeed, it was Paris the place chosen to hold conferences and meetings of the members of the Union, which – to use Sumner's words – "has bound France to Belgium, Switzerland, Italy and Greece". This vision is also supported by Einaudi, which refers to France as the "hegemonic power" within the Union (Einaudi, 2000, p. 304).

Consequently, the empirical approach will devote particular attention to these two issues, i.e. heterogeneous effects both in terms of geography (hub-and-spokes relationships) and institutions (due to the changes and challenges outlined above in this paragraph).

---

[20] Emphasis mine.

[21] To simplify, we use here the term "central banks". However, being in a transitory era where the institution of central bank is steadily but not rapidly emerging, it would be more precise to refer to the institutions involved as "national banks of issue", or "national issuing banks", this being particularly true in the cases of Italy and Switzerland for a relevant part of the period under scrutiny.

IV.   Methodology and data

The quantitative analysis presented in this paper exploits RICardo,[22] a publicly available database that collects bilateral trade flows since the beginning of the 19th century onwards. The database includes trade values of both imports and exports, providing comparable series of data for the period under scrutiny.[23] For every country pair (country A and country B), RICardo database shows four bilateral trade data: imports from and exports to B recorded by A, and imports from and exports to A recorded by B – i.e. mirror flows. Depending on the method used by each country to record trade flows, discrepancies may emerge, and indeed are so common that a relevant part of the literature try to deal with such issue (see Dedinger and Girard, 2016). For the purpose of this research, I used three criteria to assemble the database: more reliable sources over less reliable sources (i.e. prioritising statistical offices/bureaux with higher historically recognised capability), longer time-series data over shorter time-series data (to avoid "jumps" in trade data only due to a change in the source used), and imports data over exports data, as in a historical context they are more reliable (see i.a. Tena, 1992). The correct selection of time and space boundaries also constitutes a key issue. Concerning space, I followed Flandreau (2000), and restricted the analysis to intra-European trade flows. The sample is representative as it is approximately equal to 80 per cent of total world trade (Bairoch, 1996). The period of analysis is important for two main reasons: 1) endogeneity concerns and 2) understanding exactly what is measured with the LMU dummy. To control for endogeneity, I follow Head and Mayer (2014), and I include a period previous to the signature of the Monetary Convention. I expand the database backward until 1861. It is not possible going further back, as this would imply a significant and non-casual loss of observable dyads. Moreover, I should also highlight that Italy, a LMU member, became unified only in that year.[24] On the other end of the database, the LMU lasted *de jure* until 1927. There is little doubt that after WWI the LMU lost completely its meaning (Bae and Bailey, 2011), however it is still unclear when it is exactly its end *de facto*. Consequently, the paper will analyse the period 1861 – 1913, allowing for three different time specification for the LMU dummy, to cover the possibility to have diverse trade effects related to a set of key events, which will be further discussed below in this section – together with the rest of the variables. The final database consists of an unbalanced panel of more than 6,500 dyads (see Table 1 for summary statistics), and contains 53 year of observation (1861-1913).

---

[22] RICardo – Research on International Commerce – is the result of the efforts of a team of economic historians, which initiated the project in 2004, with the aim of assembling a unique database including all world's bilateral trade flows, from the 19th century until WWII (as after WWII trade statistics are published and available online). More information about the project are available at www.ricardo.medialab.sciences-po.fr

[23] However, we are fully aware of the limitations of international trade historical statistics, with particular reference to reliability and comparability. Indeed, until approximately 1850s statistics record values in constant prices; before 1870s they mainly refer to the "port of transit"; since the 1870s they report the nationality of the vessel of origin. It is only at the beginning of the 20th century when public officers in charge of statistics start to investigate further the real country of origin. See Tena (1992) for further discussion.

[24] The consequences of such "epoch-making event" (Federico and Tena, 2013, p.1) on trade are definitely not negligible. Italian trade flows are not available before 1861, and despite the impressive efforts in the literature for reconstructing early 19th century imports and exports of "Italian" polities (Federico and Tena, 2013), these are not comparable and cannot be included in the database

Table 1: Summary statistics for the main variables

VARIABLES	Description and sources	N	mean	sd	min	max
imports	Imports from country j to country i *RICardo Database*	6,503	4.259e+06	7.518e+06	0	8.041e+07
lnPOP	Logarithm of population *Maddison Project Database*	6,650	18.48	1.416	15.50	21.81
lnGDP	Logarithm of GDP *Maddison Project Database*	5,770	20.23	1.660	15.75	24.70
lndistcap	Logarithm of the distance between capitals *CEPII GeoDist Database*	6,650	6.905	0.621	5.153	8.003
contig	Existence of a shared border in a dyad *CEPII GeoDist Database*	6,650	0.218	0.413	0	1
LMU	dummy variable for dyads where both countries are LMU members (time-variant), with three alternatives related to LMU effects: 1865-1913 (LMU), 1865-1885 (LMU1885), and 1865-1874 (LMU1874) *Author's elaboration*	6,650	0.131	0.337	0	1
LMUFrance	dummy variable for dyads which includes France (the hub) and any of the other LMU members (a spoke) (time-variant), same three alternatives as above (see LMU variable) *Author's elaboration*	6,650	0.0589	0.236	0	1
LMURest	dummy variable for dyads where both countries are LMU members, but excluding France (two spokes) (time-variant), same three alternatives as above (see LMU variable) *Author's elaboration*	6,650	0.0716	0.258	0	1
GS	dummy variable for dyads where both countries adhere to the gold standard (time-variant) *Author's elaboration on Officer*	6,650	0.415	0.493	0	1
SCU	for dyads where both countries are members of the Scandinavian Currency Union (time-variant) *Author's elaboration*	6,650	0.0241	0.153	0	1
LMU-other	dummy variable for dyads where one country is a LMU member and the other is not (time-variant), same three alternatives as above (see LMU variable) *Author's elaboration*	6,650	0.412	0.492	0	1
France-other	dummy variable for dyads which includes France (the hub) and any other non-LMU member (time-variant), same three alternatives as above (see LMU variable) *Author's elaboration*	6,650	0.134	0.340	0	1
LMURest-other	dummy variable for dyads where one country is a LMU member (excluding France) and the other is not (time-variant), same three alternatives as above (see LMU variable) *Author's elaboration*	6,650	0.279	0.448	0	1
AllianceTreaty	Dummy variable signalling a formal alliance (including mutual defense pacts, neutrality and non-aggression treaties, ententes, etc.) between the dyad (bilateral treaties) or among a number of countries including those of the dyad *Author's elaboration on Correlates of War Project*	6,650	0.0995	0.299	0	1

Source: Author's elaboration

The analysis relies on an augmented gravity model, based on the theoretical contributions of i.a. Helpman and Krugman (1985) and Anderson and Van Wincoop (2003), which explains bilateral trade flows by transaction costs and economic size:

$$(1) \qquad X_{ijt} = \beta_0 + \beta_1 \ln(POP_{it} * POP_{jt}) + \beta_2 LMU_{ijt} + \beta_3 GS_{ijt} + \beta_4 SCU_{ijt} + \\ + \beta_5 AllianceTreaty_{ijt} + \gamma_{it} + \delta_{jt} + \theta_{ij} + \epsilon_{ijt}$$

where X_{ijt} denotes the logarithm of nominal imports flows from country j (exporter) to country i (importer) in year t.[25] The economic size of country i and j at time t are proxied by the product of their population (as in Huberman, Meissner and Oosterlinck, 2017), due to limited availability of GDP data (used as robustness test). LMU is a dummy variable taking the value of one when both countries pertain to the LMU and zero otherwise. This variable varies over time as the database include a period prior to the Union, and also retains a (minimum) cross-sectional variance as not all members entered at the same time. Such characteristics allows to include pair fixed effect in the model without incurring in problems related with collinearity. In the "baseline", the LMU is considered to last from 1865 to 1913. Alternatively, two other dummies are constructed: LMU1874 and LMU1885. The first aim to understand whether market beliefs on the sustainability of the bimetallic standard influenced the LMU trade effects (LMU = 1 from 1865 to 1874). On the other hand, the second aims to understand whether the changing nature of the treaty, and its "liquidation clause" in particular, was detrimental to within-union trade flows (LMU = 1 from 1865 to 1885). In any of these three specifications, the LMU dummy aims to quantify the "overall" LMU effects on trade (as in Flandreau, 2000). GS and SCU are two additional control variables. GS is a dummy variable which takes the value of 1 if both countries i and j are in the gold standard at time t, and zero otherwise. SCU is a dummy variable identifying the Scandinavian Currency Union (=1 if both countries are SCU members and =0 otherwise). "AllianceTreaty" is a dummy variable which takes the value of 1 when a formal alliance (including mutual defense pacts, neutrality and non-aggression treaties, ententes, etc.) between the dyad (bilateral treaties) or among a number of countries including those of the dyad has been signed. Data are from the Correlates of War Formal Alliance dataset. Different measures of military alliances, such as "defense pacts", which are "the highest level of military commitment, requiring alliance members to come to each other's aid militarily if attacked by a third party" (Gibler, 2009), are also used as further robustness tests. Introducing another dummy identifying countries shadowing LMU standards would have been ideal, however the limited number of observations contained in the database for such group of countries (see Appendix II for the list of countries shadowing the LMU standards) do not allow to do so. Following Head and Mayer (2014), I include in the main specification of the model also importer time-varying effects (γ_{it}), exporter time-varying effects (δ_{jt}),[26] and pair fixed effects (θ_{ij}). In this way it is possible to account for factors such as macroeconomic policies or consequences deriving from trade treaties (i.e. tariff levels, a concern of particular importance due to the parallel development of the Cobden-Chevalier network, see discussion below), importer and exporter GDP and GDP per capita (separately), and other transaction costs, such as distance, contiguity, and common languages (including pair fixed effects automatically excludes these variables from the equation due to collinearity).[27] In

---

[25] When "poisson" regression is used, then imports are inserted in level and not in logarithmic scale, as the poisson function automatically adapts the level to its logarithmic correspondent.

[26] Importer and exporter time-varying effects consist in importer and exporter fixed effects multiplied by year fixed effects.

[27] Before the Baier and Bergstrand (2007) contribution, it was a standard procedure in literature to proxy for transaction costs by measuring distance between countries pair (in logarithm), and including a dummy that takes value one when a dyad has a common border (called "contiguity"). We do so in one robustness test (see Appendix VI). In our case distance measures and contiguity dummies are from CEPII GeoDist Database. Distance therefore is a computation of geodesic

particular, the inclusion of pair fixed effects is in line with Baier and Bergstrand (2007) suggestion for ruling out possible endogeneity biases deriving from previous level of trade exchanges (i.e. the argument being that nations with intense trade relations can be more prone to reach an international agreement, such as the LMU, among themselves), or other factors like pre-monetary convention exchange rate agreements, informal coinage arrangements, previous homogenization of currency standards. Separate model specifications with (a) importer and exporter fixed effects with year fixed effects, and (b) importer and exporter time-varying effects have also been considered for comparative purposes. However, the choice of including γ_{it}, δ_{jt}, and θ_{ij} is in line with what suggested in the literature (see i.a. Baldwin and Taglioni, 2006). Using different specifications – as (a) and (b) – influence the results, as expected, as the risk of incurring in an omitted variable bias is higher. Therefore, the results of these models should be considered sub-optimal with respect to the specification included in the text and should not be interpreted as robustness tests, as highlighted by Glick and Rose (2016). For example, they do not take into account tariffs explicitly. Even though several papers relativised the role of tariffs, they mainly focused on the beginning of my period of analysis. Indeed, Accominotti and Flandreau (2008), i.a., argue that trade liberalisation (in the form of trade agreements) achieved little, and this being particularly true in the 1860s-1870s decades, both for institutional and political reasons. Lampe (2009) finds no effects of those years of liberalisation (by the means of bilateral treaties) on overall trade, nevertheless he argues that product-specific preferences are effective in enhancing trade in goods pertaining to the categories directly affected by non-generalised tariff reductions, mainly manufacturing. In a successive publication, Lampe (2011) stresses the *ex-ante* economic and political forces as main drivers and pillars of the success for this 19th century European integration experiment, rather than any substantial overall *ex-post* results. In addition, Federico and Vasta (2015) argue that – using Italy as a case study – trade restrictiveness measures were probably overestimating the tariff-based protection, downplaying the role of tariffs in economic development during the pre-WWI era. On the other hand, Flandreau and Mauriel (2005) include a measure of protection[28] both for the importer and the exporter country. For the period they analysed, 1880-1913, their inclusion has relevant effects on the final estimations, particularly to those of the "gold standard" dummy and the "LMU" dummy. The authors explain the variation in the gold standard dummy, i.e. reduction of the coefficient when introducing protection measures, arguing that countries on gold were also relatively more prone to "free trade" policy. The effect on LMU, i.e. the negative coefficient becoming not statistically significant, may be linked to the disruptive Italian-French tariff war of the 1890s. Finally, β_0 is the constant and ϵ_{ijt} the error term.

In addition, to consistently test the hypothesis of different trade patterns between hub-and-spokes flows and spoke-to-spoke flows, the LMU dummy is substituted by LMUFrance and LMURest, also dummy variables. The former takes value one when describes dyads which includes France (the hub) and any of the other LMU members (a spoke), and zero otherwise. The latter instead identify a bilateral trade flow between two spokes, both LMU members (=1; and 0 otherwise)

$$(2) \quad X_{ijt} = \beta_0 + \beta_1 \ln(POP_{it} * POP_{jt}) + \beta_2 LMUFrance_{ijt} + \beta_3 LMURest_{ijt} + \\ + \beta_4 GS_{ijt} + + \beta_5 SCU_{ijt} + + \beta_6 AllianceTreaty_{ijt} + \gamma_{it} + \delta_{jt} + \theta_{ij} + \epsilon_{ijt}$$

---

distance on the basis of the "great circle formula" and using capital cities in term of population, "distcap" variable in CEPII GeoDist Database. In addition, common language is also inserted in the regression as an additional robustness test (results are not reported for simplicity, but are available upon request).

[28] Protection is defined as "the ratio of custom revenues to total trade".

Finally, a variation of equation (II) is considered to test whether the trade-enhancing effects of the monetary agreement where obtained at the expenses of non-members, i.e. if the creation of the LMU had *de facto beggar-thy-neighbor* effects, as argued for other interwar agreements by a consistent part of the historical literature (see i.a. Aldcroft, 2001). As suggested in Gowa and Hicks (2013) if the database contains only a limited number of countries (16 in my case) it is preferable, due to a high risk of collinearity, not to include at the same time dummies that – as in equation (1) and (2)– detect intra-agreements trade flows (LMU, LMUFrance, LMURest, GS, SCU) and those that try to capture eventual trade diversion effects ("*beggar-thy-neighbor*" dummies: LMU-other; France-other; and LMURest-other) outside the block.

The quantitative analysis will rely on the use of Poisson estimators. Indeed, basic econometric procedures, such as the OLS procedure has increasingly been challenged by scholars, i.a., Santos Silva and Tenreyro (2006). The reasons for discarding OLS estimations in favour of Poisson may be clustered in three major groups (Shepherd, 2009; UNCTAD and WTO, 2012): (1) Poisson estimator is consistent with fixed effects, a rare property for a nonlinear maximum likelihood estimator; (2) it is able to deal with zero values, a situation that may arise when there is no trade between a country pair, automatically considering those observations in the estimates; (3) Coefficients obtained from a Poisson regression are of unequivocal interpretation, and retain the same meaning as in OLS estimations with a logarithmic dependent variable.

V. Results

The results from the gravity equation models are presented in Table 2. I confirm previous findings (i.a. Flandreau, 2000), of an overall non-significant effect of LMU on within-Union bilateral trade flows during the period 1865-1913. This is also true when separating flows between France and the rest of LMU members on one side, and among the rest of the LMU members on the other. However, when contemplating the LMU as "active" only for the periods when market still considered the bimetallic standard as viable, the LMU produced positive effects on bilateral trade flows, but for those between France and the other members, and not for those among the rest of members. These results are in line with the historical evidence presented in this text.

Results in column 1 shows that the LMU did not exert any positive effects on trade among its members, when considering 1865-1913 as a period of reference for its existence, i.e. from its creation until the beginning of the WWI. Its "overall" effects are not significant. When discerning France-related trade flows from the rest of the Union, results are again in line with the conventional knowledge of no LMU-related trade effects (column 2). However, when interacting the LMU with a time dummy, to focus on the period from 1865 to 1885, until the moment in which the "liquidation clause" is introduced in the treaty, the coefficient of the LMU dummy becomes significant, and negative (column 3, LMU<0). This may reflect that trade links between France and the rest of the LMU were deteriorating in the long term, as were the functioning of LMU institutions that may have cause such drawback (column 4, LMUFrance<0). Nevertheless, in the 1865-1885 period the LMU coefficient is positive (LMU1885>0), but these positive effects are concentrated in the flows from and to France (column 4, LMUFrance1885>0). Overall, the "LMU" effects in 1865-1885 are not significantly different from zero (LMU+LMU1885=0). However, when the period of LMU "*de facto* effectiveness" is

reduced to 1865-1874, year in which markets started requiring a premium for silver (Flandreau and Oosterlinck, 2012), meaning that the market started downgrading the chances of bimetallism to last, LMU effects on trade flows are positive (column 5, LMU+LMU1874>0), and concentrated in the flows from and to France (column 6, "LMUFrance1874"). France-directed trade may have several explanations, ranging from the structure of trade itself to finance and politics. Indeed, the significant effects on trade between France and the rest of members may be the consequence of an integration that fostered the development of an underlying Heckscher-Ohlin type of trade, involving exchanges of differentiate goods between the hub and the spokes. They can also be related to the enhancement of capital exports – from France to the rest of the members – that in turn would boost trade, as part of these financial flows "would lead to an increase in demand on the part of the borrowing nation of foreign goods" (Flandreau, 2000). In addition, the contribution of France to monetary stability of the LMU was also important, through the role of the Banque de France – the principal institution in the LMU – in supporting both domestic and foreign silver (Flandreau, 1996), and this could have had spillovers on trade. Summarising, as Luzzatti (1883, cited in Nardi Spiller, 1994, p. 366) remarked, "bimetallism, limping as today, could not stand without that great centre of attraction and compensation that is France".[29] However, as this research uses aggregate trade data, it is not possible to separate empirically these effects.

Further, in line with what expected, the coefficients of other variables are stable across the different specifications included in Table 2. The attraction "size" (the natural logarithm of the product of population in country i and j) is positive and significant. The gold standard dummy is positive and significant, in agreement with the literature on its trade enhancing role (i.a. Lopez-Cordova and Meissner, 2003). The SCU reports an unexpected negative sign, but it is important to remember that all dyads where SCU=1, have also GS=1, so the coefficient would represent the SCU effects net of the GS, which is somewhat artificial. However, if reading together the two coefficients, they approximately average out. The effects of formal alliances ("AllianceTreaty") are negative. Indeed, there is no clear-cut lesson in the literature, and the sign may vary depending on the content of the treaty (robustness test provided in Appendix VI), on the perceived signatories' commitment (as the benefits deriving from trade to income can be translated into increases in military power, if the parties involved do not trust each other, they have the incentive in lowering trade rather than increasing it, see Gowa and Mansfield 1993; Gowa 1994), and on the importance that weapons, ammunitions, and other items related to public procurement have on overall trade (which at the time was non-negligible, see Flandreau, 2000).

---

[29] In Italian in the original: "Il bimetallismo, zoppo qual è oggidì, non potrebbe sostenersi senza quel grande centro di attrazione e di compensazione che è la Francia".

Table 2: Bilateral trade flows and monetary agreements, 1861-1913.

	(1) LMU 1861-1913	(2) LMU 1861-1913	(3) LMU 1861-1885	(4) LMU 1861-1885	(5) LMU 1861-1874	(6) LMU 1861-1874
LMU	-0.127 (0.094)		-0.182* (0.095)		-0.158* (0.094)	
LMUFrance		-0.132 (0.093)		-0.209* (0.095)		-0.147* (0.094)
LMURest		0.0817 (0.159)		0.129 (0.166)		0.0810 (0.163)
LMU1885			0.155*** (0.0336)			
LMUFrance1885				0.167*** (0.0330)		
LMURest1885				-0.222*** (0.059)		
LMU1874					0.205*** (0.055)	
LMUFrance1874						0.205*** (0.055)
LMURest1874						-0.105 (0.093)
lnPOP	1.665*** (0.190)	1.665*** (0.190)	1.664*** (0.190)	1.654*** (0.189)	1.663*** (0.190)	1.658*** (0.190)
SCU	-0.441*** (0.092)	-0.441*** (0.092)	-0.459*** (0.093)	-0.449*** (0.093)	-0.473*** (0.094)	-0.467*** (0.094)
GS	0.295*** (0.040)	0.295*** (0.040)	0.259*** (0.039)	0.253*** (0.039)	0.262*** (0.039)	0.264*** (0.039)
AllianceTreaty	-0.157*** (0.025)	-0.156*** (0.025)	-0.158*** (0.024)	-0.132*** (0.025)	-0.155*** (0.025)	-0.140*** (0.025)
N	6,503	6,503	6,503	6,503	6,503	6,503

Source: Author's elaboration

Notes: Poisson regressions. Dependent variable: Imports (value). All regressions include a constant, importer-year, exporter-year and dyad fixed effects, not reported for the sake of simplicity. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Robustness tests

Additionally, to ensure the robustness of these findings, a set of alternative specifications have been considered, and results are included in Table 3.

As a first robustness test, I run the standard gravity model used by Flandreau (2000) in order to compare the results with my database extracted from RICardo (Column (1) in Table 2). The only differences are in the dependent variable, that in my regression is "imports" only (as I take into account the development of the debate on gravity models, e.g. Baldwin and Taglioni, 2006; Glick and Rose, 2016), whereas in Flandreau's paper (previous to that debate) is represented by "total trade" (exports+imports), and in the variable representing the economic size which, to maintain coherence, in my regression is represented by the natural logarithm of the product of population of country i and j, instead of the logarithm of the product of total trade in country i and j, for the period 1861-1885. In addition, the current analysis includes annual observations for each country pair, meaning – in practice

– that relies on a panel data set structure. Flandreau's analysis instead, is cross-sectional in nature. All the variables have the expected signs, and are in line with Flandreau's estimations. In addition, to have a simply and clear picture of the sensitivity of results to alternative specifications, I report in this appendix further robustness tests. To be concise, I focus on the main specification, the one separating trade flows between France and other members from those among the rest of the members, for the period 1865-1874. In column (2), I show the results using OLS, and ln(1+trade) as dependent variable (to avoid subjective truncation). However, literature suggest (e.g. Santos Silva and Tenreyro, 2006; Gomez-Herrera, 2013) that OLS – even if corrected for information losses (truncation) – does not behave well if heteroscedasticity is present in data. Indeed, in this case, estimators will not be consistent. The gold standard coefficient turns negative (and non-significant), consistently with evidence collected in Gomez-Herrera (2013). Coefficients of LMUFrance and LMURest does not change sign, but their significance is affected. However, even if the specification is ill-defined and possibly biased, significant difference between the two remains. I also test specification: a) excluding dyad fixed effects and cluster errors instead, to allow more variance in the data (column 3); b) excluding Germany from the data (column 4), as literature suggests that results may be sensible to the evolution of trade outside the currency block (e.g. Glick and Rose, 2016); c) including GDP data instead of population data (column 5), which have the benefit of reflecting more closely the "economic mass", but the cost of consistently reducing the sample (-12%); d) considering only those treaties which implied "the highest level of military commitment, requiring alliance members to come to each other's aid militarily if attacked by third party", technically defined as "defense pacts" (Gibler, 2009).   In general, across different models the LMUFrance1874 coefficient is always positive and significant. The LMURest coefficient is always negative. However, its significance depends on the specification. Nevertheless, the central argument of this paper, a consistent difference between LMUFrance and LMURest, is stable and significant across all specifications. Therefore I can argue that these results do not depend on specification choices (Table 3).

Table 3: Robustness tests

	(1) Flandreau's specification (OLS)	(2) OLS [ln(1+trade)]	(3) poisson, clustered error no dyad FE	(4) PPML clustered error	(5) poisson, without Germany	(6) poisson, with GDP instead of POP	(7) poisson, only defense agreements
LMU	0.0209 (0.093)						
LMUFrance		-0.214 (0.179)	0.865*** (0.204)	0.370 (0.294)	-0.146 (0.095)	-0.101 (0.099)	-0.235** (0.092)
LMURest		0.366 (0.265)	0.216 (0.529)	-0.224 (0.451)	0.128 (0.170)	0.260 (0.161)	0.122 (0.161)
LMUFrance1874		0.153 (0.133)	0.508* (0.280)	0.624*** (0.123)	0.138** (0.052)	0.205*** (0.055)	0.227** (0.054)
LMURest1874		-0.380* (0.200)	-0.491 (0.405)	0.046 (0.171)	-0.378*** (0.082)	-0.129 (0.096)	-0.207** (0.092)
lndistcap	-1.716*** (0.056)						
contig	0.441*** (0.085)						
lnPOP	0.946*** (0.021)	2.071*** (0.190)	0.730*** (0.102)	0.613*** (0.059)	1.630*** (0.190)		1.612*** (0.188)
lnGDP						1.567*** (0.179)	
SCU	1.487*** (0.231)	0.965*** (0.171)	1.404*** (0.284)	0.555* (0.292)	-0.479*** (0.094)	-0.459*** (0.094)	-0.415*** (0.093)
GS		-0.015 (0.0988)	0.720*** (0.211)	1.038* (0.102)	0.195*** (0.039)	0.284*** (0.041)	0.293*** (0.040)
AllianceTreaty		0.090 (0.064)	1.204*** (0.222)	0.334 (0.209)	-0.189*** (0.024)	-0.137*** (0.025)	
Defense							0.040 (0.045)
N	2,668	6,503	6,503	6,503	5,474	5,714	6,503

Source: Author's elaboration

Notes: Imports. All regressions include a constant, column (2) to (6) also importer-year, exporter-year and dyad fixed effects (unless differently specified) not reported for the sake of simplicity. Robust standard errors in parentheses (unless differently specified); *** p<0.01, ** p<0.05, * p<0.1.

Nevertheless, the gravity model alone is not able to identify beyond any reasonable doubts the precise date in which the LMU power (in terms of within-Union trade creation) started to fade away. Further tests are needed, and they will be provided in the subsection below.

LMU trade effects: When was the turning point? An assessment of structural breaks

Once identified the effects of the 1874 and 1885 events through the use of gravity models, the readers may still wonder whether these outcomes may simply reflect other external shocks, like wars or changing trade patterns. The latter is a particular concern for 1885, which indeed may only capture, endogenously, the persistency of the decline generated by the 1874 turmoil. To test my hypotheses, then, I need to reinforce my analysis with structural break analysis, focusing on bilateral trade relations. The aim is to understand whether LMU countries bilateral trade flows are experiencing a "structural break" in these dates. The procedure used is standard in the literature, and consist in performing a

Wald test of whether the coefficients of trade flows in a specific country-pair time series regression are varying or not (H_0: no structural break).[30] Table 4 shows the results of the test for LMU country-pairs in 1874 and 1885. All the time series analysed, excluding those concerning Switzerland – France and Switzerland – Italy (which could be subject to the flaws typical of Swiss trade data that are less evident in a panel data structure; see Tena, 1992), show a structural break in 1874. In 1885 instead, there is no evidence of a LMU-wide structural break.

Table 4: Structural break tests, LMU country-pairs trade flows

Country pairs	Structural break in 1874	Structural break in 1885
Belgium – Switzerland	YES**	NO
France – Belgium	YES**	YES**
Italy – Belgium	YES***	NO
Belgium – Greece	n.d.	n.d.
France – Greece	YES*	NO
Switzerland – France	NO	NO
France – Italy	YES*	YES**
Italy – Greece	YES**	NO
Switzerland – Italy	NO	NO
Greece – Switzerland	n.d.	n.d.

Source: Author's elaboration
Notes: *** p<0.01, ** p<0.05, * p<0.1. Approximately 5% of data for Italy – Greece have been interpolated to allow the test to be performed. n.d.= no data.

Nevertheless, whereas evidence showed above is sufficient to exclude a LMU-wide effect of the 1885 treaty reform on trade flows, there is still the need of further analysis for avoiding a sort of "false positive" identification. Indeed, I must be sure that the identified 1874 structural break affects only within-LMU trade flows. If also other trade relationships, i.e. members with non-members, would be affected, this would raise doubts over the proper identification of the structural break as a "LMU shock". Therefore I have to perform a further test for the robustness of my hypothesis, selecting external countries not affected by other exogenous shocks in 1874, as these could introduce noise in the results. Natural candidates are Britain, a symbol of stability, and those countries which also had a bimetallic standard but were not part of the LMU. Arguably, this is the best possible solution to isolate "pure-LMU" shocks. I proceed to analyse all the complete (i.e. no gaps between 1861 and 1913) time series available for these dyads. In any of these cases bilateral trade flows registered a structural break in 1874 (see Table 5).

---

[30] This procedure is robust to unknown forms of heteroscedasticity, differently from the traditional Chow test.

Table 5: Structural break tests, LMU-Britain trade flows

Country pairs	Structural break in 1874
Belgium – Britain	NO
France – Britain	NO
Greece – Britain	NO
Italy – Britain	NO
Switzerland – Britain	n.d.
Additional tests for other bimetallic countries	
France – Austria-Hungary	NO
France – Spain	NO
Italy – Austria-Hungary	NO
Belgium – Spain	NO

Source: Author's elaboration
Notes: *** p<0.01, ** p<0.05, * p<0.1. n.d.= no data, i.e. no sufficient data to perform the test.

Combining the outcomes of the gravity model with those of the structural break analysis, I am inclined to postulate that the LMU affected trade flows of its members. Results show that this was the case for trade flows between France and the rest of countries in the period 1865-1874, until its underlying economic foundations (i.e. bimetallism) were credible to the eyes of markets. As showed in this subsection, this represented a turning point in the evolution of trade between members. Since then, the LMU effects on trade flows diminished. Indeed, when considering the "full pre-WWI period" of activity, gravity models do not find any influence on the Union on trade.

Beggar-thy-neighbor

In this section, I try to shed some light on not only whether trade-enhancing monetary agreements actually manage to enhance trade among their members, but also whether they create distortionary effects diverting trade among member and non-member states to members' only relationships instead. To do so, I follow Gowa and Hicks (2013) and Yang and Martínez-Zarzoso (2014) methodology. Therefore, starting from the same gravity model specification, I drop the dummy variables related to monetary agreements, as – due to sample restrictions – they are collinear with the "new" dummies that I insert to identify eventual trade diversion, i.e. an increase in trade between members' and non-members' pairs. Overall, as it is possible to see in equation (1) reported in Table 6, the LMU had no trade diverting effects, when considering the period 1861-1913 (LMU-other=0). On the contrary, there is evidence that the gold standard had some trade diversion effects (GS-other<0). This is consistent with the evidence proposed in the literature (Meissner, 2005), explaining the adherence to gold standard in terms of trade-related network externalities.[31] The LMU appears to have trade diverting effects particularly in the periods when it enjoyed market credibility, i.e. until when bimetallism lost its attractiveness as an alternative to gold (LMU-other+LMU-other1874<0). It is important to note that results are consistent with the ones reported in Table 2, concerning trade effects of monetary agreements among their members.

---

[31] Meissner highlights also the importance of a more accessible borrowing and the level of development as drivers of gold standard membership.

Table 6: Beggar-thy neighbor trade and monetary agreements

	(1) LMU 1861-1913	(2) LMU 1861-1913	(3) LMU 1861-1885	(4) LMU 1861-1885	(5) LMU 1861- 1874	(6) LMU 1861-1874
LMU-other	0.053 (0.045)		0.082* (0.046)		0.071 (0.046)	
LMUFrance-other		0.158*** (0.078)		0.270*** (0.078)		0.256*** (0.078)
LMURest-other		-0.050 (0.079)		-0.087 (0.080)		-0.062 (0.079)
LMU1885-other			-0.077*** (0.017)			
LMUFrance-other1885				-0.284*** (0.031)		
LMURest-other1885				0.119*** (0.029)		
LMU-other1874					-0.101*** (0.028)	
LMUFrance-other1874						-0.291*** (0.039)
LMURest-other1874						0.093*** (0.036)
lnPOP	1.686*** (0.191)	1.644*** (0.193)	1.697*** (0.191)	1.619*** (0.192)	1.692*** (0.191)	1.630*** (0.192)
SCU-other	0.227*** (0.051)	0.227*** (0.051)	0.239*** (0.051)	0.234*** (0.051)	0.246*** (0.052)	0.237*** (0.052)
GS-other	-0.147*** (0.020)	-0.147*** (0.020)	-0.129*** (0.020)	-0.126*** (0.020)	-0.130*** (0.020)	-0.124*** (0.020)
AllianceTreaty	-0.158*** (0.025)	-0.156*** (0.025)	-0.158*** (0.024)	-0.131*** (0.025)	-0.155*** (0.024)	-0.136*** (0.025)
N	6,503	6,503	6,503	6,503	6,503	6,503

Source: Author's elaboration

Notes: Poisson regressions. Dependent variable: Imports (value). All regressions include a constant, importer-year, exporter-year and dyad fixed effects, not reported for the sake of simplicity. Robust standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

VI.   Conclusions

This paper revises the conventional view that the LMU had no overall effects on international trade. I confirm the findings of Flandreau's (2000) pioneering work – being the first paper using cliometric techniques on such issues. In addition, however, I allow for heterogeneous effects on trade relations between France and the rest of the LMU members on one side, and among the rest of LMU members on the other side, characterising different periods of "LMU effectiveness" based on historical circumstances and evidence, and using an augmented gravity model which also take into account political powers. Within such framework, this study has shown that the LMU was relevant for trade flows under certain conditions.

Indeed, if analysing the entire period under consideration (1865-1913), estimates show an insignificant effect on overall within-LMU trade, a result that mirrors its institutional weaknesses. Nevertheless, when considering factors related to the changing conditions in the international environment affecting the LMU underlying economic foundations (i.e. the limits on silver coinage agreed upon in 1874) and the rules of the Union (i.e. the "liquidation clause" of 1885), the data support the hypothesis that the LMU had significant trade effects for the period 1865-1874. These effects were nonetheless concentrated in the flows between France and the rest of LMU members. Moreover, structural break analysis confirmed that only in 1874 (and not in 1885) there was a "LMU-wide" structural break, which affected the evolution of trade flows within the Union. These new findings are in line with the new primary sources obtained from archival research and included in the paper, and previous qualitative evidence available in the literature.

Even if it is tempting to expand and apply the results to present times, we should keep in mind that the LMU structure never reached a level of complexity and development similar to the current EU architecture: it did not foresee any prearranged form of structural intervention at the Union level, nor shared decision methods going beyond the intertwinement of varied international relations within a framework of pure intergovernmental procedures. Any comparison should therefore be extremely cautious taking into consideration the level of integration reached in contemporary times within the EU, being the Euro (and consequently a common European Central Bank) and the "community" method for decision making (emphasising the supranational sphere) two overarching examples. However, the LMU represented a political entity – with an inadequate institutional backbone – which struggled for decades to adapt itself to a fast-changing economic reality, and finally failed in its attempt. Under this perspective, the LMU provides potential lessons. The LMU limited engagement with supranational activities and its weak institutional setting – lacking of any shared space where to build constant, fluent, and multi-stakeholder networks (with the exception of ad hoc conferences held in Paris) – was unsuccessful in establishing a consistent Union-level economic space.

Further research is needed to discern the drivers of the LMU heterogeneous effects on trade flows, to embrace (or reject) the hypotheses of 1) an underlying Heckscher-Olhin type of trade involving exchanges of differentiate goods within the LMU; 2) significant LMU-related capital exports influencing trade flows; 3) various institutional and political drivers associated to the LMU structure.

References

Accominotti O. and M. Flandreau (2008), "Bilateral Treaties and the Most-Favored-Nation Clause: The Myth of Trade Liberalization in the Nineteenth Century", *World Politics*, **60**:147-188.

Adams M., F. Fabbrini and P. Larouche (2016), *The Constitutionalization of European Budgetary Constraints*, London: Hart Publishing.

Albertin G. (2008), "Trade Effects of Currency Unions: Do Economic Dissimilarities Matter?", IMF Working Paper, October.

Aldcroft D. (2001), *The European Economy 1914 – 2000*, London: Routledge.

Anderson J. E. and E. van Wincoop (2003) "Gravity with Gravitas: A Solution to the Border Puzzle", *American Economic Review*, **93**:170-192.

Bae K.H. and W. Bailey (2011), "The Latin Monetary Union: Some evidence on Europe's failed common currency", *Review of Development Finance*, **1**:131-149.

Baier S.L. and J.H. Bergstrand (2007), "Estimating the effects of free trade agreements on international trade flows using matching econometrics", *Journal of International Economics*, **77**:63-76.

Baldwin R.E. (1994), *Towards an Integrated Europe*, London: CEPR.

Baldwin R.E. (2006), "The Euro's Trade Effects", European Central Bank Working Paper nº594, March.

Baldwin R.E. (2008), "The spoke trap: Hub-and-spoke bilateralism in East Asia", in B. Eichengreen, Y. C. Park and C. Wyplosz (eds.), *China, Asia and the New World Economy*, Oxford: Oxford University Press.

Baldwin R.E. , V. Di Nino, L. Fontagné, R. A. De Santis and D. Taglioni (2008), "Study on the Impact of the Euro on Trade and Foreign Direct Investment", European Economy Economic Papers nº321, May.

Baldwin R.E. and D. Taglioni (2006), "Gravity for Dummies and Dummies for Gravity Equations", NBER Working Paper 12516, September.

Barro R. and S. Tenreyro (2007), "Economic effects of currency unions", *Economic Inquiry*, **45**:1-23.

Bayer R. (2006), "Diplomatic Exchange Data set, v2006.1", available at http://correlatesofwar.org/data-sets/diplomatic-exchange.

Bolt J. and J.L. Van Zanden (2014), "The Maddison Project: collaborative research on historical national accounts", *The Economic History Review*, **67**:627–651.

Bordo M. D. and H. Rockoff (1996), "The Gold Standard as a Good Housekeeping Seal of Approval", *The Journal of Economic History*, **56**:389-428.

Cottrell P.L., G. Notaras and G. Tortella (2007), *From the Athenian Tetradrachm to the Euro – Studies in European Monetary Integration* (eds.), Aldershot, England: Ashgate Publishing Limited

De Cecco M. (1996), "The European Monetary Union: Lessons of Historical Experiece", PSL Quarterly Review, **46**:55-68.

De Grauwe (2014), *Economics of Monetary Union*, Oxford: Oxford University Press.

Dedinger B. and P. Girard (2016), "Exploring Trade Globalization in the Long Run: The RICardo Project", available at http://ricardo.medialab.sciences-po.fr/

Denzel M. (2010), *Handbook of World Exchange Rates, 1590-1914*, London:Ashgate.

Duvall R.D. (1978), "Dependence and Dependencia Theory: Notes Toward Precision of Concept and Argument, *International Organization*, **32**:51-78.

Egger P.H. and M. Pfaffermayr (2013), "The Pure Effects of European Integration on Intra-EU Core and Periphery Trade", *The World Economy*, **36**:701-712

Einaudi L. (1997), "Monetary Unions and Free Riders, the Case of the Latin Monetary Union (1865-78), *Rivista di Storia Economica*, **3**:327-362.

Einaudi L. (2000), "From the franc to the 'Europe': the attempted transformation of the Latin Monetary Union into a European Monetary Union", *Economic History Review*, **53**:284-308

Einaudi L. (2001), *Money and Politics: European Monetary Unification and the International Gold Standard (1865-1873)*, Oxford: Oxford University Press.

Einaudi L. (2007), "The Experience of Exchange Rate Regimes in Southeastern Europe in a Historical and Comparative Perspective", Workshops Proceedings of OeNB Workshops Nº13 – Second Conference of the South-Eastern European Monetary History Network, April.

Fabbrini S. (2015), *Which European Union? Europe after the Euro crisis*, Cambridge:Cambridge University Press.

Federico G. and A. Tena (2013), "The ripples of the Industrial revolution: exports, economic growth and regional integration in Italy in the early 19th century", UC3M Working Papers in Economic History, WP 13-02, April.

Federico G. and M. Vasta (2015), "What Do We Really Know about Protection before the Great Depression: Evidence from Italy", *The Journal of Economic History*, **75**:993-1029.

Flandreau M. (1996), "The French Crime of 1873: An Essay on the Emergence of the International Gold Standard, 1870-1880", *The Journal of Economic History*, **56**:862-897.

Flandreau M. (2000), "The economics and politics of monetary unions: a reassessment of the Latin Monetary Union. 1865-1871", *Financial History Review*, **7**:25-44.

Flandreau M. (2003), *The Glitter of Gold. France, Bimetallism and the Emergence of the International Gold Standard 1848-1873*, Oxford: Oxford University Press.

Flandreau M. and M. Maurel (2005), "Monetary Union, Trade Integration, and Business Cycles in 19th Century Europe", *Open Economies Review*, **16**:135-152.

Flandreau M. and Oosterlinck K. (2012), "Was the emergence of the international gold standard expected? Evidence from Indian Government securities", *Journal of Monetary Economics*, **59**:649-669.

Flandreau M., J. LeCacheux, and F. Zumer (1998), "Stability without a Pact? Lessons from the European Gold Standard, 1880-1914", *Economic Policy*, 21:115-62

Frankel J.A. (2006), "Comments on Richard Baldwin's ´The Euro's Trade Effects", European Central Bank Working Paper nº594, March

Gibler D.M. (2009), Internationa*l military alliances, 1648-2008*, Washington DC:CQ Press.

Glick R. and A.K. Rose (2002), "Does a Currency Union Affect Trade? The Time-Series Evidence", *European Economic Review*, **46**:603-617.

Glick R. and A.K. Rose (2016), "Currency unions and trade: A post-EMU reassessment", *European Economic Review*, **87**:78-91.

Gomez-Herrera E. (2013), "Comparing alternative methods to estimate gravity models of bilateral trade", *Empirical Economics*, **44**:1087-1111.

Gowa J. (1994), *Allies, Adversaries, and International Trade*, Princeton: Princeton University Press.

Gowa J. and Hicks R. (2013), "Politics, Institutions, and Trade: Lessons of the Interwar Era, *International Organization*, **67**:439-467

Gowa J. and E.D. Mansfield (1993), "Power Politics and International Trade", *American Political Science Review*, **87**:408-20.

Head, K. and T. Mayer (2014) "Gravity Equations: Workhorse, Toolkit, and Cookbook", in G. Gopinath, G, E. Helpman and K. Rogoff (eds), *Handbook of International Economics*, London:Elsevier.

Helleiner (2003), *The Making of National Money: Terriorial Currencies in Historical Perspective*, New York: Cornell University Press.

Huberman M., C.M. Meissner, K. Oosterlinck (2017), "Technology and Geography in the Second Industrial Revolution: New Evidence from the Margins of Trade", *Journal of Economic History*, **77**:39-89.

Krugman P. (2013), "The Revenge of Optimum Currency Area", in D. Acemoglu, J. Parker, M. Woodford (ed.), *NBER Macroeconomics Annual 2012*, p. 439-448.

Lampe M. (2009), "Effects of Bilateralism and the MFN Clause on International Trade: Evidence for the Cobden-Chevalier Network, 1860-1875", *Journal of Economic History*, **69**:1012-1040.

Lampe M. (2011), "Explaining Nineteenth-Century Bilateralism: Economic and Political Determinants of the Cobden-Chevalier Network", *Economic History Review*, **64**:644-668.

Lampe M. and P. Sharp (2014), "Cliometric Approaches to International Trade", in C. Diebolt and M. Haupert (ed.), *Handbook of Cliometrics*, Springer.

Lopez-Cordova J.E. and C. M. Meissner (2003), "Exchange-Rate Regimes and International Trade: Evidence from the Classical Gold Standard Era"

Luzzatti L. (1881), "Sul progetto di legge per l'abolizione del corso forzoso", 7 February. Internvention to the Chamber, reported in P.L. Ballini, P. Pecorari, F. Margiotta Broglio and M. Toscano (eds.) (2013), *Luigi Luzzatti. Discorsi Parlamentari*, Roma: Camera dei deputati – Archivio storico.

Mann M. (1986), *The Sources of Social Power – vol.1: A History of Power from the Beginning to AD 1760*", Cambridge: Cambridge University Press.

Meissner C. (2005), "A new world order: explaining the international diffusion of the gold standard, 1870-1913", *Journal of International Economics*, **66**:385-406.

Nardi Spiller C. (1994), "Luigi Luzzatti e l'Unione Monetaria Latina", in P.L. Ballini and P. Pecorari (eds.) *Luigi Luzzatti e il suo tempo: atti del Convegno internazionale di studio, Venezia 7-9 novembre 1991*, Venezia: Istituto Veneto di Scienze, Lettere ed Arti.

New York Times (1885), "The Check to Bimetallism", published on 24 November, available at http://query.nytimes.com/gst/abstract.html?res=990DE2D71E39E533A25757C2A9679D94649FD7 CF&legacy=true

Officer L.H., "Gold Standard", http://eh.net/encyclopedia/gold-standard/ (accessed 07 January 2016).

Pelkmans J. and P. Brenton (1997), "Free trade with the EU: driving forces and the effects of 'me-too' ", CEPS working documents nº110.

Persson T. (2001), "Currency Unions and Trade: How Large Is the Treatment Effect?", *Economic Policy*, **33**:435-48.

Rose A.K. (2000), "One Money, One Market: The Effect of Common Currencies on Trade", *Economic Policy*, **15**:7-45

Santos Silva J. M. C. and S. Tenreyro (2006), "The Log of Gravity", *The Review of Economics and Statistics*, **88**:641-658.

Singer J.D., S. Bremer, and J. Stuckey. (1972). "Capability Distribution, Uncertainty, and Major Power War, 1820-1965", in B. Russett (ed.) *Peace, War, and Numbers*, Beverly Hills: Sage, 19-48.

Tena A. (1992), "Las estadísticas históricas del comercio internacional: fiabilidad y comparabilidad (1890-1960)", Estudios de Historia Económica - Banco de España, nº24.

UNCTAD and WTO (2012), "A Practical Guide to Trade Policy Analysis", Geneva: World Trade Organization.

Willis H. (1901), *History of the Latin Monetary Union*, Chicago.

Yang S. and I. Martínez-Zarzoso (2014), "A panel data analysis of trade creation and trade diversion effects: The case of ASEAN–China Free Trade Area", *China Economic Review*, **29**:138-151.

Appendix I: Luigi Luzzatti in the Italian political arena

The importance of Luigi Luzzatti in the Italian political arena and its internationally respected role as a scholar in the discipline of economics are widely acknowledge both by historians and politicians. A clear example of its relevance is the publication dedicated to him by the Archive of the Italian Chamber of the Deputies, a privilege and a honour reserved to few other Italian personalities. The introduction of the book is signed by the President of the Chamber himself that wanted to actively contribute to the promotion of this historical document.

Luigi Luzzatti actively worked for almost fifty years (1871-1920)[32] within the Italian public institutions, as a deputy of the Chamber (in fourteen legislatures), as a Minister (of Treasury and Finance, in 1891-1892; 1896-1898; 1903-1905 and in 1906), as President of the Council of Ministers (1910-1911), and lastly as a Senator. In addition to that, for long time he was one of the Italian delegates to the LMU and to the International Monetary Conventions and, since 1875 until WWI, he was responsible, with different roles, for trade and tariff negotiations. During this long period, his work focused mainly in the following and largely relevant fields: Constitutional law, political economy, public finance, credit and banking, agricultural and industrial development, social rights, international trade and monetary issues, financial markets and capital flows. Unquestionably he was one of the key actors on political economy and finance matters, both when his party was in power and at the opposition.

The Luzzatti (personal) Archive in Venice (his home town) collects an impressive amount of documents since the family's donation to the Istituto Veneto di Scienze, Lettere ed Arti, authorised by the R.D. of 9 February 1933.

The Luzzatti Archive is constituted by 400 folders containing approximately 100,000 documents, of which 35,000 are letters addressed to or received from the most important European and Italian political and economic stakeholders of that time, such as Director Generals of diverse Bank of Issues, Presidents of the Council of Ministers, Senators and Deputies, LMU delegates, etc.

This appendix is based on the following documents:

Ballini P.L., P. Pecorari, F. Margiotta Broglio and M. Toscano (eds.) (2013), *Luigi Luzzatti. Discorsi Parlamentari*, Roma: Camera dei deputati – Archivio storico.

Franchini S.G. (2007), "Le carte di Luigi Luzzatti per la storia d'Italia", *Clio*, 4:625-639.

Istituto Veneto di Scienze, Lettere ed Arti official website: www.istitutoveneto.it.

Nardi Spiller C. (1994), "Luigi Luzzatti e l'Unione Monetaria Latina", in P.L. Ballini and P. Pecorari (eds.) *Luigi Luzzatti e il suo tempo: atti del Convegno internazionale di studio, Venezia 7-9 novembre 1991*, Venezia: Istituto Veneto di Scienze, Lettere ed Arti.

---

[32] Actually, Luzzatti started in 1869 working few months as Secretary General of the Ministry of Agriculture, Industry and Trade.

Appendix II: LMU membership

Table A.II.1: LMU (membership and shadowing) chronology

Country	Condition	Date	Period
Belgium	LMU founding member	23 December 1865 (W)	1865-1927
France	LMU founding member	23 December 1865 (W)	1865-1927 (H)
Italy	LMU founding member	23 December 1865 (W)	1865-1927 (H)
Switzerland	LMU founding member	23 December 1865 (W)	1865-1926 (from 1920 Switzerland banned the imports of LMU coins) (H)
Greece	LMU member	10 April 1867 declaration of intent by internal law made by Greece 18 November 1868 ratification of Greek admission by all member states (W)	1865-1927 (H)
Algeria (French colony)	shadowing	23 December 1865 (W)	n.a.
Austria-Hungary	shadowing (aligned for 25 francs gold only)	n.a.	1870-1892 (E)
Bulgaria	shadowing	17 May 1880 (W)	1881-1914 (E)
Colombia (United States of)	shadowing	9 May 1871 (W)	n.a.
Finland	shadowing (aligned for gold only)	9 August 1877 (W)	1878-1914 (E)
Peru	shadowing	31 July 1863 (first shadowing the French system) (W)	n.a.
Poland	shadowing	1926 (E)	1926 (E)
Pontifical State	shadowing	1866 (E)	1866-1870 (E)
Romania	shadowing	14 April 1867 law approval 1 January 1868 entrance into force (W)	1867-1914 (E)
Russia	shadowing (aligned for gold only)	n.a.	1886-1895 (E)
Serbia	shadowing	11 November 1878 (W)	187*-1914 (E)
Spain	shadowing	19 October 1868 (W)	1868-1914 (E)
Sweden	shadowing (aligned for gold only)	n.a.	1868-1872
Tunisia (French colony)	shadowing	23 December 1865 (W)	n.a.
Venezuela (United States of)	shadowing	11 May 1871 (W)	n.a.

Source: Willis (1901), Einaudi (2007), and Helleiner (2003)

Notes: (W) = Willis; (E) = Einaudi; (H) = Helleiner. There are some discrepancies for some of the Balkans countries: (1) for Serbia, Einaudi states that it "adopted LMU type legislation in 1873 and started minting in 1874." (p.34), (2) for Bulgaria that it "adopted legislation in June 1880 and started minting bronze in 1881 and silver in 1882." As the 25 francs gold coin was never minted, Austria minted "gold trade coins", which never became part of the national monetary system, but they remained confined in an ad-hoc system for international trade and were exchanged following their value at the stock market (p. 34).

Appendix III: LMU agreements – a chronology

Table A.III.1: LMU conferences brief chronology and main achievements

Date and classification	Main achievements
23 December 1865 - Convention	• LMU agreement signed (Belgium, France, Italy, Switzerland) for a 15 years period; • Rules on coinage, particularly on fineness, weights and issuance; • Open-ended admission clause: possibility to join for other interested countries.
18 November 1868 – French Government declaration	• Greece admission ratified by all the LMU members.
31 January 1874 – Additional Convention	• Coinage limits for 1874; • Limits to "open-ended" admission clause: Admission formally subordinated to the previous agreement of all members.
5 February 1875 – Declaration	• Coinage limits for 1875; • Exceptional coinage concessions to Italy.
3 February 1876 – Declaration	• Coinage limits for 1876.
1877 Diplomatic correspondence	• Coinage limits for 1877.
1878 Diplomatic correspondence	• Coinage limits for 1878.
5 November 1878 – Declaration	• Coinage limits for 1879.
5 November 1878 – Convention	• Extension of the LMU for a 6 years period. The agreement includes the possibility of a year-on-year renewal after the first six; • Provisional suspension of the 5 francs silver coinage (despite the provisional nature of the measure, the prohibition of issuing new coins will remain valid until the end of the LMU); • Stipulates the repatriation conditions for Italian divisionary coins
20 June 1879 – Additional Act	• Foresees changes in the repatriation conditions for Italian divisionary coins (the Italian Parliament was called to choose between the 1878 and 1879 agreement, selecting the latter)
6 November 1885 - Convention	• Extension of the LMU for a 5 years period. The agreement includes the possibility of a year-on-year renewal after the first five; • Confirms and includes the "repatriation" principle (i.e. "liquidation clause"); • Specifies the "repatriation" rules; • Specifies the conditions under which the Banque de France will accept other members' coins.
12 December 1885 – Additional Act	• Confirms the adhesion of Belgium to the LMU.
15 November 1893 – Arrangement	• Regulates the "repatriation" of Italian divisionary coins
29 October 1897 – Additional Convention	• Increases the coins/population ratio (from 6 to 7 francs per habitant).
15 March 1898 – Additional Protocol	• Ends the circulation of Italian divisionary coins.
15 November 1902 – Additional Convention	• Provisions on coins issuance
4 November 1908 – Additional Convention	• Increases the coins/population ratio (from 7 to 16

	francs per habitant); • Regulates the "repatriation" of Greek divisionary coins.
25 March 1920 – Additional Convention	• Regulates the reciprocal "repatriation" of divisionary coins between France and Switzerland; • Provisions on coin issuance
9 December 1921 – Additional Convention	• Regulates the "repatriation" of LMU divisionary coins from Switzerland (after they were declared out of circulation)
28 December 1925 – Belgian Government Declaration	• Declares the willingness of Belgium of exiting the LMU; • The other members agree on ending the LMU experience.

Source: Einaudi (2001); Flandreau (2000, 2003); "Procès-Verbaux" of the different LMU conferences (1874; 1875; 1876; 1879; 1885; 1893); Treaties of the different LMU conventions and the agreements (1865; 1878; 1885; 1908).

Table A.III.2: Classical Gold Standard adherence chronology

Country	Years
Austria-Hungary	1892-1914
Belgium	1878-1914
Denmark	1872-1914
Finland	1877-1914
France	1878-1914
Germany	1871-1914
Greece	1885 and 1910-1914
Italy	1884-1894
Netherlands	1875-1914
Norway	1875-1914
Portugal	1854-1891
Spain	*De jure* never adhered to the gold standard
Sweden	1873-1914
Switzerland	1878-1914
United Kingdom	1774-1797 and 1821-1914

Source: Officer.

Note: The table reports information for all the countries included in the sample.

BANCO DE ESPAÑA PUBLICATIONS

WORKING PAPERS

1621 ADRIAN VAN RIXTEL, LUNA ROMO GONZÁLEZ and JING YANG: The determinants of long-term debt issuance by European banks: evidence of two crises.

1622 JAVIER ANDRÉS, ÓSCAR ARCE and CARLOS THOMAS: When fiscal consolidation meets private deleveraging.

1623 CARLOS SANZ: The effect of electoral systems on voter turnout: evidence from a natural experiment.

1624 GALO NUÑO and CARLOS THOMAS: Optimal monetary policy with heterogeneous agents.

1625 MARÍA DOLORES GADEA, ANA GÓMEZ-LOSCOS and ANTONIO MONTAÑÉS: Oil price and economic growth: a long story?

1626 PAUL DE GRAUWE and EDDIE GERBA: Stock market cycles and supply side dynamics: two worlds, one vision?

1627 RICARDO GIMENO and EVA ORTEGA: The evolution of inflation expectations in euro area markets.

1628 SUSANA PÁRRAGA RODRÍGUEZ: The dynamic effect of public expenditure shocks in the United States.

1629 SUSANA PÁRRAGA RODRÍGUEZ: The aggregate effects of government incometransfer shocks - EU evidence.

1630 JUAN S. MORA-SANGUINETTI, MARTA MARTÍNEZ-MATUTE and MIGUEL GARCÍA-POSADA: Credit, crisis and contract enforcement: evidence from the Spanish loan market.

1631 PABLO BURRIEL and ALESSANDRO GALESI: Uncovering the heterogeneous effects of ECB unconventional monetary policies across euro area countries.

1632 MAR DELGADO TÉLLEZ, VÍCTOR D. LLEDÓ and JAVIER J. PÉREZ: On the determinants of fiscal non-compliance: an empirical analysis of Spain's regions.

1633 OMAR RACHEDI: Portfolio rebalancing and asset pricing with heterogeneous inattention.

1634 JUAN DE LUCIO, RAÚL MÍNGUEZ, ASIER MINONDO and FRANCISCO REQUENA: The variation of export prices across and within firms.

1635 JUAN FRANCISCO JIMENO, AITOR LACUESTA, MARTA MARTÍNEZ-MATUTE and ERNESTO VILLANUEVA: Education, labour market experience and cognitive skills: evidence from PIAAC.

1701 JAVIER ANDRÉS, JAVIER J. PÉREZ and JUAN A. ROJAS: Implicit public debt thresholds: an empirical exercise for the case of Spain.

1702 LUIS J. ÁLVAREZ: Business cycle estimation with high-pass and band-pass local polynomial regression.

1703 ENRIQUE MORAL-BENITO, PAUL ALLISON and RICHARD WILLIAMS: Dynamic panel data modelling using maximum likelihood: an alternative to Arellano-Bond.

1704 MIKEL BEDAYO: Creating associations as a substitute for direct bank credit. Evidence from Belgium.

1705 MARÍA DOLORES GADEA-RIVAS, ANA GÓMEZ-LOSCOS and DANILO LEIVA-LEON: The evolution of regional economic interlinkages in Europe.

1706 ESTEBAN GARCÍA-MIRALLES: The crucial role of social welfare criteria for optimal inheritance taxation.

1707 MÓNICA CORREA-LÓPEZ and RAFAEL DOMÉNECH: Service regulations, input prices and export volumes: evidence from a panel of manufacturing firms.

1708 MARÍA DOLORES GADEA, ANA GÓMEZ-LOSCOS and GABRIEL PÉREZ-QUIRÓS: Dissecting US recoveries.

1709 CARLOS SANZ: Direct democracy and government size: evidence from Spain.

1710 HENRIQUE S. BASSO and JAMES COSTAIN: Fiscal delegation in a monetary union: instrument assignment and stabilization properties.

1711 IVÁN KATARYNIUK and JAIME MARTÍNEZ-MARTÍN: TFP growth and commodity prices in emerging economies.

1712 SEBASTIAN GECHERT, CHRISTOPH PAETZ and PALOMA VILLANUEVA: Top-down vs. bottom-up? Reconciling the effects of tax and transfer shocks on output.

1713 KNUT ARE AASTVEIT, FRANCESCO FURLANETTO and FRANCESCA LORIA: Has the Fed responded to house and stock prices? A time-varying analysis.

1714 FÁTIMA HERRANZ GONZÁLEZ and CARMEN MARTÍNEZ-CARRASCAL: The impact of firms' financial position on fixed investment and employment. An analysis for Spain.

1715 SERGIO MAYORDOMO, ANTONIO MORENO, STEVEN ONGENA and MARÍA RODRÍGUEZ-MORENO: "Keeping it personal" or "getting real"? On the drivers and effectiveness of personal versus real loan guarantees.