Networking Cities, Weaving States: The Early Modern Geography of Money

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Comments welcome

In this article, we use network analysis techniques to study the evidence from a new database on international foreign exchange linkages in the mid-eighteenth century. We produce a picture of structural monetary relations within Europe on the eve of the Industrial Revolution. Important findings include country specific patterns of centralization and the importance of market forces in the making of national and international monetary geography.

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"Ne faudra-t-il pas la nouvelle poussée économique du XVIIIème siècle pour que le verrou saute et que l'économie se place sous le contrôle des Etats et des marchés nationaux, ces puissances lourdes auxquelles tout est permis? Donc il n'est pas étonnant que les Etats territoriaux, réussite politiquement précoce, n'atteignent que tardivement la réussite économique qu'a été le marché national, promesse de leurs victoires matérielles"

Fernand Braudel, *Civilisation matérielle*

Robert Mundell's path breaking article on Optimum Currency Areas deals with monetary geography from the vantage point of individual regions' welfare (Mundell 1961). This, Mundell emphasized, may imply either breaking up countries into smaller monetary policy areas, or transferring sovereignty to higher bodies such as supranational monetary unions, or both. Indeed, sub-national neighboring regions, belonging to two different countries, may find it advantageous to have a single currency. In this perspective, existing monetary boundaries, inherited from political histories that have little to do with economic welfare, are seen as hampering more than facilitating. Mundell did recognize that for his proposals to have practical value, political boundaries had to be in a state of "flux", in a situation were they could be redesigned. For economics to provide a guide to an optimal monetary geography, national borders must be plastic – an unlikely hypothesis. Thus, for better or for worse, and Mundell suggested that it was more often for worse, nations and monies happen to coincide.

The more recent theory of endogenous optimum currency areas has reversed the causation. Derived from Lucas' critique, according to which one cannot judge of the effects of a given policy by looking at the behavior of agents before that policy was implemented, this view emphasizes that monetary unification involves deep structural changes that may influence its eventual desirability. Initially developed to suggest that EMU might not be sustainable, owing to induced trade specialization (Eichengreen 1992, Krugman 1993) this view has later served as a theoretical foundation for a more positive assessment of monetary unions. Frankel and Rose (1998) suggest that the prevalence of intra-trade in today's developed nations increases rather than decreases business cycle correlation and thus makes monetary unions more sustainable. Historical investigation by Flandreau and Maurel (2005) further suggests that trade integration and specialization are not the only channels through which monetary unions have structural effects. Looking that the 19th century when trade specialization arguably dominated, they outline the existence of offsetting factors. Financial integration and diversification, both resulting from the making of a common money market (be it national or supra national) are powerful factors contributing to spread supply shocks across a monetary union. Fiscal rules, on the other hand, contribute to making demand shocks more homogeneous. In the end, monetary unions may very well be purely political constructs ex ante, but that does not necessarily preclude their becoming economically optimal ex post.

This brings to the fore the processes through which policy does "make" monetary geography (McNamara 2003). On this account, a recent study by political scientist Eric Helleiner argues that the making of national money is a recent phenomenon. It took place long after the emergence of nation states that followed the Peace of Westphalia of 1648 (Helleiner 2002). According to Helleiner, territorial currencies were only established in the 1815-1914 period, with the expansion of state policies aimed at unifying monetary and financial spaces along national lines. National monies having come into being fairly recently, Helleiner also suggests, they might not be here for long. This speculation echoes the earlier work of Benjamin J. Cohen, according to whom market forces (or "globalization") are swiftly eroding the typical nation's state monopoly power in supplying base money (Cohen 1998). The implication is that national currencies are mortal.

For historians, political scientists and economists alike, these views raise a number of fascinating questions. If market forces erode national monetary power, how can we explain that the deepening of globalization, in the late 19th century, precisely coincided with the consolidation of monetary authority and the emergence of policies aimed at nationalizing money? Similarly, if the development of national money took place long after the Peace of Westphalia, then how should we describe the international monetary order that prevailed during the long interregnum of 1648 to 1815? Does it mean that it had no structure? But we know from the work of economic historians that international currencies existed as early as in the 17th century with the rise of Amsterdam's florin (Kindleberger 1992). Is the implication that "internationalization" of currencies took place before their "nationalization", and if so how can we account for that?

These considerations explain why we think that a careful study of the 18th century international monetary order is potentially rewarding. At one level, such a study is interesting in and for itself, since we know very little about that period. It is indeed to be deplored that much of the research effort focuses on the period following the emergence of the gold standard in the 1870s. But more fundamentally, the early modern period underlines the complex interactions between the making of national money and the forces of globalization. Such issues are very relevant today: therefore, a more rigorous and focused understanding of the period *after* the formation of "Westphalian" states but *before* the making of national monetary domains could be particularly instructive. To the extent there has been in the recent period a "retreat of the state" in monetary matters, concentrating on the 18th

century, when we are told that the state had not yet stepped in everywhere, could be theoretically insightful.

This paper looks at this question with two complementary methodological innovations. First, we focus on foreign exchange relations and thus on the extent to which "local" currencies circulated "abroad". This way of approaching the phenomenon of the internationalization of money leads us to identify the relevant unit of analysis for the period under study. Both before and after the Peace of Westphalia, monetary relations were not organized around the financial capital centered *national* money market, but around the trading city level. Importantly, there could be several cities coexisting at the national level and since cities branched with one another at both the national and international levels, national and international dimensions were not differentiated in the same fashion as they would become later on. Looking at things this way enables us to construct a systematic map of inter-city monetary relations that is straightforwardly amenable to modern network analysis techniques. This is the second innovation we make. By exploiting these powerful techniques, we are able to study the contours of international and intra-national foreign exchange market linkages in Europe, and thus make a number of empirically based inferences on early modern European monetary geography.

Critically, this way of looking at things provides an explicit way to test a central implication of contemporary views on the making of territorial currencies. Suppose indeed that their emergence is a 19th century phenomenon and the result of deliberate state policies that were just not there in the 18th century. If this view is correct, then we should expect national factors to have played no role in shaping inter-city exchange relations in the 18th century. Specifically, cities belonging to different countries would branch with one another in the very same way as countries belonging to the same country, once we control for other factors. By contrast, finding evidence of an incidence of "national" factors in shaping the mid-18th century geography of money would suggest that political factors were already at work. This is the question with which much of this paper deals.

The rest of the article is organized as follows. Section I provides a brief survey of the literature dealing with the making of territorial currencies in the 19th century. Section II describes monetary relations in the 18th century and outlines differences with subsequent periods. We show that monetary relations are best described as having been organized on a city level, with foreign exchange consisting essentially in private credit instruments incorporating contractual guarantees. Section III describes the data and methods. Section IV discusses the results.

I. From Cities to Nations

Helleiner's analysis of the making of territorial currencies in the 19th century focuses on a number of substantive and symbolic policy actions that contributed to the organization of monetary and financial spaces within political boundaries in the 19th century. The result, he claims, was the creation of a one to one correspondence, mapping monetary geography into political geography and vice versa. Among these various measures, he especially emphasizes the exclusion from circulation of foreign specie, the promotion of national symbols for which banknotes became supports, and an increased reach of central banks. They played a critical role in promoting clearing and settlement systems along national lines (Helleiner 2002).

In this paper, we take a narrower perspective and focus on one implication of one aspect of the process through which currencies became territorial. Specifically, we explore monetary relations among individual cities (i.e., sub-national entities) in the middle of the 18th century. We think of this approach as particularly relevant because it enables to capture competing and possibly conflicting political and economic factors in the post-Westphalian era. More fundamentally, as we proceed to explain in the next paragraph, inter-city monetary connections disappeared in the 19th century when states effectively succeeded in replacing them with international exchange relations. Thus our focus is certainly consistent with the discussion in Helleiner, although we recognize that our more restricted vantage point does not do justice to Helleiner's sweeping analysis. On the other hand, we think that the promotion of national symbols through domestic currencies or the exclusion of foreign currencies from domestic circulation are more controversial and perhaps also less significant criteria.[2]

Thus this paper focuses on inter-city foreign exchange markets relations in the 18th century. Yet the phrase "foreign exchange" requires a word of explanation. By "foreign exchange" is meant short term IOUs that were traded in one city and payable in another one. These IOUs stated the amount of cash (specie) that would have to be paid on settlement date. They were thus tied to different currencies depending on the country's regulations and legal tender laws operating where the payment had to take place. On the surface it would seem therefore that bills payable in different towns but within a given country, because they were subjected to the authority of the same ruler, would essentially be

[2] . For instance one may remark that during the late 19th century, when the triumph of "national" money was supposedly complete a number of monetary treaties and unilateral regulations legalized the domestic circulation of foreign coins. If anything, the number of foreign currencies that could circulate in France in 1890 was larger, not smaller, than it had been say 60 years earlier. Similarly, one may remark that Kings insisted on having their face represented on their currency. This in effect cost Louis XVI his life, since he was arrested in Varennes when a bystander recognized him after his own coins.

perfect substitutes for one another. But this was not the case: paying *écus* in Paris was not the same as paying *écus* in, say Marseilles. Transferring specie from one market to the other one entailed a variety of costs (shipping, insurance, delay). Individual markets had idiosyncratic habits regarding how bills would be cashed or how long would be the "grace period" (i.e. number of days between the date when a bills was presented and the time when it had to be effectively paid). Finally, there was heterogeneity in the quality of credit, because various centers often specialized in different trades and thus bore different risks and also because of differences in the way local commercial courts would handle bankruptcy.

As a result, IOUs between two cities of the same Kingdom or Republic did not trade at one for one, or to use the language of the time, at par, but rather, at a discount or premium depending on supply, demand and risk. Moreover, just as in the familiar analysis of "gold points" that would prevail between countries under the gold standard of the 19th century, the premium or discount could not grow larger than the cost of shipping legal tender between the two cities. Therefore, there was no substantive difference between intra-national (or domestic) and inter-national (or foreign) exchange rates. This conclusion is critical.

Now, as we found in two earlier studies (Flandreau and Jobst 2005 and 2006) this city-centered organization gave way in the 19th century, at least in Europe, to a national financial capital centered set-up. This is not that foreign exchange markets became fully centralized: local financial markets did not disappear and even prospered and they occasionally kept a foreign exchange shop for international arbitrage. But the point was that, seen from foreign countries, the bills of different cities within the same country became perfect substitutes. And foreign exchange bulletins, when they did not identify a single foreign exchange capital (such as London or Paris) reported a uniform "German", "Swiss", "Italian" or "Belgian" exchange rate.

Among critical transformations that can account for these differences is the role of central banks and the uniform transferring and paying facilities they provided. For instance, the exchange on Bordeaux or Lyons, two important commercial cities in France disappeared in the London's Course of exchange a few years after the Bank of France received the monopoly of issue over the entire country. Similarly, the creation of the *Reichsbank* following Germany's unification and the opening up of an automatic regional transfer facility in 1876 caused exchange rates on different German cities to align on one another so that exchange rates on Frankfort, Hamburg, Berlin became essentially the

expression of a single “German mark” quotation. This suggests that political and institutional factors as opposed to market forces were responsible for driving these changes. Outside of Europe, the US experience also provides evidence of the role of political factors in the elimination of domestic exchanges: it took the founding of the Fed to fully eliminate domestic exchange rates and create a spatially homogeneous domestic money market (Breckenridge 1898, Davis 1965, James 1976, Garbade and Silber 1979).

Our conclusion therefore is that the nationalization of domestic exchange markets cannot be assigned to a “natural” process of financial market centralization. The visible hand of state intervention seems to have been required to achieve this, and the result was a shift from a city-centered international architecture, to a state-centered one. In this general context, this paper deals with one specific question. Namely, we want to know whether states had any influence on the structure of the city-centered regime, or whether some ingredients of the subsequent order were already discernible. To address this question, however, we must leave the comfortable shores of the well-charted 19th century monetary history and sail towards largely unknown 18th century international financial relations.

II. Mapping Money: The Significance of Foreign Exchange Quotations

To be specific with the kind of data we are focusing on, one example is helpful. Consider for instance the information we have on the “foreign exchange market” of Marseilles, a French city port on the Mediterranean. A spare set of copies of Marseilles’ “course of exchange” bulletins, kept in the *Chambre de Commerce de Marseille* (hereafter CCM), and dated July, 1753, informs us on Marseilles’ main foreign exchange connections around that date. One of these bulletins is reproduced in Figure 1. As can be seen, Marseilles was listing six centers that did not belong to the Kingdom of France, namely (by alphabetical order) Amsterdam (Dutch Republic), Cadiz (Kingdom of Spain), Lisbon (Kingdom of Portugal), Leghorn (in Italian Livorno, in the Duchy of Tuscany), London (United Kingdom), and Madrid (Kingdom of Spain). It was also listing two centers that were part of the Kingdom of France, Paris and Lyon.

Figure 1. Facsimile copy of the Marseille foreign exchange bulletin

To Be Inserted

What is the significance of this information?[3] The straightest route is to begin by focusing on the way merchant-bankers conducted their business in the early modern period. Their trade rested on the development of extensive business relationships covering a wide array of cities, with one or several connections in each city. These business relations were used as merchant bankers sought to buy, sell, or finance commodity transactions, or else to lend and borrow either on the security of goods or in any other fashion in which the parties agreed. Correspondents and correspondence were also kept when there were no trade motives but because of the dire need to remain informed. This meant having many connections and writing lots of letters.

An illustration is provided by the "*liste des correspondents*" register kept by the house of Roux in Marseilles (its archive is actually the place where the foreign exchange bulletin in Figure 1 comes from).[4] This source displays 1900 correspondents covering the period 1728-1843, of which 1250 in France. Even assuming that these entries were one shot business relations (while in fact many of them weren't), and noting that since most of the correspondence is before 1800, we get an average portfolio of 190 correspondents per year – this, just for one bank. Historians working on merchant banking monographs have relished constructing maps displaying the geographical reach of given merchant banks. The result is often revealing of the considerable scope that many houses achieved (see e.g. Carrière 1973, Squarzoni 1976).

Thus any banker in any city could and did secure credit from, or extend it to, a vast list of bankers located in other centers. In practice however, when deciding where they should secure credit from, bankers had to take into account costing, in which interest rates, expected future exchange rates, and liquidity mattered because they determined actual returns. Since currencies were tied to specie, short term interest differentials and exchange rate risk premiums were bound to fluctuate more or less randomly. Liquidity, by contrast, had to do with underlying economic relations and was distributed in a systematic way: there were liquid centers and less liquid ones. Consider for instance a banker in Marseilles holding a bill payable in, say, Amsterdam. If Marseilles and Amsterdam have extensive financial and commercial relations, then the banker is quite likely to find someone willing to buy the bill. That bill will therefore display a greater liquidity in this market than a bill payable in, say, Saint Petersburg, which has close to zero relations with Marseilles. The result is that, other things being

[3] . A discussion of the meaning of such information in the context of the late 19th century is provided in Flandreau and Jobst (2005). We highlight here specific features that are relevant to the context of the 18th century.
[4] . CCM, L. IX, Fonds Roux liasse 107-1004.

equal, bills on Amsterdam in Marseilles might develop a market while bills on Saint Petersburg might not, so that we find evidence in Marseilles of a market for Amsterdam's bills, but not for Saint Petersburg's.

Thus we are likely to observe the development of liquid, well-organized foreign exchange markets where commercial and financial intercourse is also most intense. Consider for instance a number of individual bank networks, i.e. the list of connections that banks in a given city have with banks in others. Then, we expect exchange rates entries to appear in the foreign exchange market of a given city for counterparts that are economically relevant to it, since this will always reveal that there exists a large pool of underlying individual banking connections with that same foreign center. Among the many cities where Roux and other bankers had connections, only some generated enough transactions to motivate the formalization of an interbank secondary market. In other words, the point is that exchange rate lists are a particularly informative way to capture and map foreign exchange relations. The only thing that remains to be done therefore is to collect information on available foreign quotations for every single city. This obviously is easier said than done, as the next section shows.

III. The Data

Suppose now that we are able to retrieve the same kind of material we have for Marseilles, but for all commercial towns in Europe. By so doing, one should be able to study monetary relations in the 18th century by focusing on the relevant unit of analysis, namely the city level. This is what we do in this paper. From a mathematical point of view, we produce a network matrix whose entries are individual cities, with lines comprising ones or zeroes depending on whether a given city was traded or not in a given foreign exchange market. The Marseilles line in this matrix has ones for Amsterdam, Cadiz, Lisbon, Leghorn, London, Lyons, Madrid and Paris, zeroes for other centers.

Our primary material is local foreign exchange markets bulletins. We relied on three main sources. First, when they were available we used official or semi-official foreign exchange bulletins, such as London's course of exchange as reproduced in *Lloyd's* list, a periodical (see Neal 1991 and Flandreau and Jobst 2005 for a discussion). However, official or quasi-official listings are only available for a handful of cities (Amsterdam, London, Paris), and other sources must be used if one is to go beyond these particularly convenient cases. As a typical illustration, we were not able to find an official listing for Marseilles.

Thus our second source is John McCusker and Cora Gravesteijn's masterful compilation of price and exchange "courants" (McCusker and Gravesteijn 1991). This provides directions to archives containing original copies of local foreign exchange bulletins, and following their indications, it is possible to go to these sources and retrieve the information they contain. This is how we were directed to the Roux archive at the *Chambre de Commerce de Marseilles*. In effect, going to the sources they have compiled leads to further finds that are not listed in their book and considerably enrich the database.

Many of the foreign exchange bulletins that can be found in archives were unofficial publications. They do not bear any official mention. Most typically they consist of single page documents with a printed list of foreign centers and corresponding handwritten exchange rate quotations. A date is usually indicated, but there is typically no "author". These sources hardly form a continuous series. In the most extreme case only one single bulletin is available. Two additional features concerning these sources are worth mentioning. First, it is almost certain that these lists were sent by local merchant bankers to their correspondent abroad. Evidence supporting this conjecture is that in most of the cases local bulletins were found in the archives of foreign banks, not in local sources, suggesting that they had been sent abroad.[5] The second, related feature is that there were also instances where different correspondents did not provide perfectly identical evidence. This is not atypical. Neal has argued for instance that even in the case of quasi-official lists there could be discrepancies across competing sources. It may also be that information providing bankers anticipated on the specific interests of their correspondents, so that these differences may reflect the heterogeneity of alternative networks. We shall see, however, that differences are never so considerable that they discourage using such sources. In fact we generally found that the evidence from alternative sources was on average mutually reinforcing.

Our last source is the 1756 edition (2nd edition) of a merchant's handbook published and updated regularly between 1737 and 1798 (Giraudeau 1756). Giraudeau was a merchant from Geneva. His volume was meant to provide accurate and systematic information of local currencies, weight, measures, and trading techniques. The section of his book that dealt with foreign exchange relied on information and memos written by correspondents and thus his methodology was fairly similar to the

[5] . We call this the "mirror principle": in the archives of Marseilles bankers, you find Amsterdam, and in the archives of Amsterdam bankers, you find Marseilles.

one we have applied using bankers' archives. In one case (Lisbon) Giraudeau reproduces a quotation for the very same date for which we happen to find an original listing.[6]

The availability of overlapping evidence enables to double check quality of sources and to better understand their intrinsic logic. This is useful because it enables us to improve our interpretation of the evidence thus gathered. This way, we have learned that Giraudeau was undoubtedly an expert. For some cities, such as Lyon, for which there the foreign exchange market was an over the counter market among banks, so that no foreign exchange lists seems to be available, Giraudeau's detailed indications turn out the only way to figure out Lyons' list of financial links (Giraudeau 1756: p. 140. On Lyons, see also McCusker and Gravestijn 1991, p. 353-6).

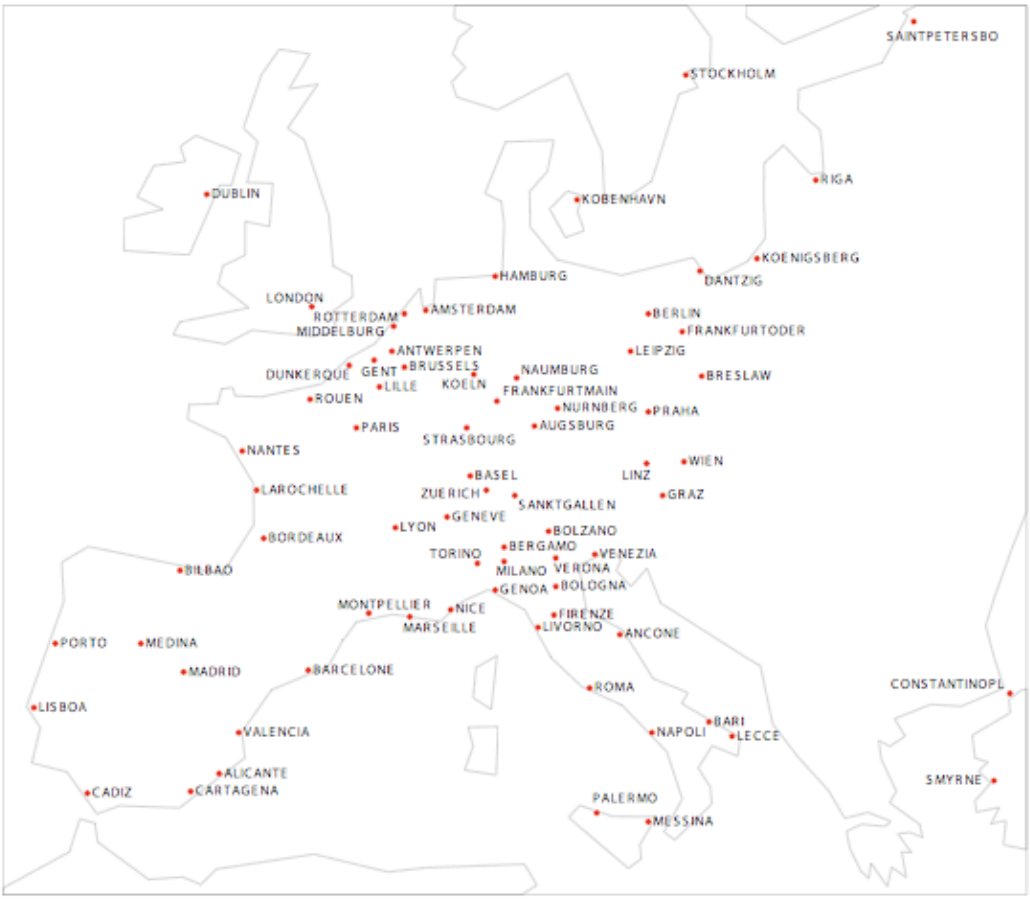
However, we also saw that Giraudeau was sometimes more of an artist than of an accountant. For instance, comparing the evidence of Giraudeau and the EHB list for Lisbon March 18, 1755, we find that Giraudeau's indications overlap perfectly with the listing found in the EHB, except for Rome and Vienna which he does not care to report, although there is evidence of transactions on bills payable in these two cities in our other source. Similarly it is not uncommon to find Giraudeau casually aggregating quotations on a given regional (e.g. Brabant) or national (e.g. France, or "*Paris, Lyon, etc*."), although these are listed separately in original source. It seems that since Giraudeau was primarily interested in providing readers with details on the instrument of settlement in which foreign exchange contracts were denominated, he used shortcuts when instruments were identical as was the generally case in regions or countries. Finally, although this seems to be more of a problem for later editions of the book, we found that Giraudeau used window dressing devices, such as changing the date of the reported quotation in revised editions so that his tables would look updated, but did not care to actually revise the contents. For this reason, we have always favored official listings over unofficial bulletins, and unofficial bulletins over Giraudeau. Finally, we have used our knowledge of how Giraudeau worked to make inferences regarding underlying data.

Given this general background, the data was collected in the following way. We started with collecting the information from bulletins in McCusker and Gravestijn (1991), and this led us to identify 77 cities as listed in at least one of the sources. Considering that this is only for Europe, we think of this number as a pretty large one. For each city, we then sought to identify a source for the foreign exchange market, be it "primary" (course of the exchange bulletins) or secondary (Giraudeau).

[6] . The city is Lisbon, the date 18 mars 1755, the references in EHB archive BIJZ Koll 472 and in Giraudeau (1756) p. 192.

Currently, we are able to document 49 of the 75 listed cities, but we wish on improve and increase somewhat on this.

Figure 2. European Financial Centers Circa 1760



Drawn with Philcarto - http://perso.club-internet.fr/philgeo

Figure 2 provides a map that reports all the 75 cities featuring in the database as listed by at least one bulletin. As can be seen, the locations are evenly scattered all over Europe with out reaches on the fringes of Orient (Constantinople and Smyrna). It is quite interesting to remark that by going after European lists, we were never led, apart for these cases, to non-European quotations. This suggests the existence of a “European” financial system, a view which is also consistent with the perspective of contemporary foreign exchange handbooks which often refer to either a “European” or “Christian” area as their key focus. Locations typically correspond to important cities that are either part of bigger political constructs and strictly subjected to the power of a ruler, such as Paris, or essentially sovereign entities, such as Hamburg. It is notable that the proportion of ports is considerable (35 out of 75 or close to one half). As can be seen, there are indeed typically several markets per country. Note finally that Britain stands out as the one large country with only one financial center. It is possible that we

have overlooked information. But the hard fact is that these centers, if they had any foreign exchange market at all, weren't quoted in London (which did quote Dublin), nor in any of the 48 bulletins that we got to inspect. It is not irrelevant for our purpose to remark that the most advanced economy of the world was in the mid 18th century a highly centralized one, as far as money is concerned.

Figure 3 provides a map of the centers for which we do have information (circles) and for those for which we don't (dots). As can be seen, some improvements should be made for Spain and South West France, the Dutch Republic, Austria and finally Italy's Adriatic coast. It does remain, however, that our coverage is pretty satisfying because the centers we are leaving out are typically secondary ones, featuring rarely if at all, in other cities' lists. The missing cities thus tend to be more obscure ones: in the language of networks, it is the less "popular" members of the tribe that are underrepresented.

Figure 3. European Financial Markets in 1760 and the Database

To fill in each of its 2352 cells (this is a 49x49 matrix but a city quoting itself does not make any sense) we proceeded as follows. For each given center, we identified whether or not each other "foreign" center was "listed" (i.e. its name appears as an entry in the source for the given center), and whether or not it was "quoted" (a quote appears in front of the name entry).[7]

The precise algorithm we used to construct the database from sources is as follows. If there was a reliable official course of exchange source, as is the case currently for Amsterdam and London only (but as will eventually be the case for a somewhat larger list of cities), we used this source. If not, then we used the "informal" bulletins found in archives. When there were several sources, we developed two measures. The narrow one takes the intersection of the various sources. That is, we only record as listed or quoted the cities that are listed or quoted in all sources. The broad one takes the reunion of the various sources. That is, we record all cities that are listed or quoted in at least one source. Finally, if no primary foreign exchange market source is available, we turn to Giraudeau.

Table 1. From Sources to the Database: Marseilles

	Source N° 1 Bulletin	Source N° 1 Bulletin	Source N° 2 Bulletin	Source N°2 Bulletin	Giraudeau	Databases Generated			
	Listed ?	Quoted ?	Listed ?	Quoted ?	Listed ?	"Listed Narrow"	"Listed Broad"	"Quoted Narrow"	"Quoted Broad"
Amsterdam	Yes	Yes	Yes	Yes	Yes	1	1	1	1
Cadiz	Yes	Yes	Yes	Yes	Yes	1	1	1	1
Genoa	No	No	Yes	Yes	Yes	0	1	0	1
Lisbon	Yes	Yes	No	No	No	0	1	0	1
Leghorn	Yes	Yes	Yes	Yes	Yes	1	1	1	1
London	Yes	Yes	Yes	Yes	Yes	1	1	1	1
Lyons	Yes	Yes	Yes	Yes	Yes	1	1	1	1
Madrid	Yes	Yes	Yes	Yes	Yes	1	1	1	1
Paris	Yes	Yes	Yes	Yes	Yes	1	1	1	1
All others…	No	No	No	No	No	0	0	0	0

Sources: "Source N° 1": 23 and 30 July 1753, CCM 1030 "Cours des changes à Marseille" ; Source N° 2: 10 bulletins, 1748, CCM 1030 "Cours des changes à Marseille" ; Giraudeau, p. 153, 9 juin 1751

Table 1 shows in the case of Marseilles how we went from sources to network data. In this case, there is no need to use Giraudeau, since we have two primary sources, although we took care to collect the information from Giraudeau. Note also that the two bulletins give the same information for all centers but Lisbon and Genoa, which are listed and quoted in one source but not in the other one.

[7] . Because of data constraints, we made no effort to identify whether the given center was "actively" quoted or not (e.g. a new quote would be posted in every bulletin), although this could be potentially interesting, as it may reveal various degrees of liquidity, and thus a greater or lesser foreign circulation of domestic bills. The reason is that our sources do not permit to do this in a stable and consistent fashion. Some bulletins, because of their greater availability, would enable to discern scales of liquidity, while others would not, so that in the end we are left with a dichotomous variable as the only consistent measure.

Note also, incidentally, that Giraudeau is siding with the second primary source.[8] Because of the two possible dichotomies (listed or quoted, and intersection or reunion), the result is four databases, designated as "listed narrow", "listed broad", "quoted narrow" and "quoted broad".[9] In what follows we focus on the "quoted broad" database. At this stage, however, differences among the various databases are negligible and can safely be ignored.

IV. Network analysis: the European financial system circa 1760

In what follows, we provide a characterization of the European financial system in the mid-18th century by relying on network analysis techniques. Figure 4 maps the information from our database. As can be seen, the European system was a dense web with a number of identifiable hubs. The distinct picture of a crescent of intense financial linkages that goes from northern Italy through Eastern France and Germany towards Amsterdam and Hamburg catches the eye.

Figure 4. The Network, 1760

Source: Authors' database

[8] . We do not make anything out of it, apart from concluding that Giraudeau would be an acceptable substitute, had original sources not been available. Note that the number of instances when we had to make use of judgment is limited and thus we are confident that there is no serious interpretation hazard.

[9] . For the sake of completeness we intend, at a later stage, to treat Giraudeau as one additional bulletin in competition with the other unofficial lists. This will generate four additional databases: "Giraudeau listed narrow", "Giraudeau quoted narrow", "Giraudeau listed broad" and finally "Giraudeau quoted broad".

a. In degrees

Figure 5 provides a ranking of cities according to the number of quotes they received. We find first cities that are connected to the Atlantic trade: Amsterdam, London, Paris and Hamburg. They are followed by the "Northern Italian" area, that includes Leghorn, Lyon, Genoa, Venice. A "Habsburg" zone, including Spanish, Austrian and Lombard elements comes next: Vienna, Augsburg, Milano, Cadiz, Madrid. Rome joins the lot, in between Cadiz and Madrid. All these receive above 10 quotes: they are quoted in at least one fifth of the cities in the population under study. Beyond this point however, all cities are quoted less than 7 times. As the statistical analysis shall reveal later, they can be thought of as being of secondary importance.

Generally speaking it is interesting to note both the dominance of North Western European financial centers (Amsterdam, London, Paris, Hamburg) and the continued relevance of cities in the Southern/Mediterranean area. Leghorn and Genoa are indisputably the two leading financial center of this later zone. The data thus both confirms and qualifies traditional accounts of a 17th century shift in European economic geography from a Mediterranean centered system to a North Western area revolving around Amsterdam (e.g. Braudel). In the 18th century, Genoa and Leghorn's junior statuses are already perceptible, but they had by no mean declined into obscurity. They were undoubtedly still financial centers with an international reach. Finally, it is interesting to note that Amsterdam was quoted almost everywhere: we find it in 44 out of 48 possible markets, or about 92% of the cases.

Figure 5: End of Paper

b. Standard statistics

We now take a look at a number of standard network test statistics. To help the reader figuring out their significance, we compare them with the properties of the late 19th century international monetary network studied in Flandreau and Jobst (2005). One should however take comparisons with care: as indicated the late 19th century network was country-based, while the one under study here is city based.

Table 2 summarizes the information. As can be seen, the network is highly concentrated. Not everybody connects with everybody, far from that. Only 16% of the entire possible connections are open. At the same time the connectivity of the network is very substantial. The average distance between two cities is 1.776. This means that other financial centers are reached either directly or

through the agency of a third market. Obviously, the presence of Amsterdam as a "global" connecting center is a critical reason for this outcome. The conclusion is that, already in the 18th century, the florin was an international currency in a truly modern sense. Finally, it is interesting to remark that, while quite hierarchical as indicated by the higher proportion of asymmetrical relations (0,1) compared to symmetrical ones (1,1), the 18th century European monetary order displayed a non trivial proportion of symmetrical links (7.2%). Comparison with the 19th century system cannot really be made however, because we are dealing here with a European dataset, while the 19th century network is international.

Table 2. Structural Properties of the Network: mid-18th century and late 19th century compared

	mid 18th century	Late 19th century		
		1890	1900	1910
1. density	0.160	0.098	0.110	0.133
2. pairs in % (if random %)				
(0,0)	75.2 (70.5)	84.3 (81.4)	82.7 (79.2)	79.6 (75.1)
(1,0) or (0,1)	17.6 (27.0)	11.7 (17.7)	12.5 (19.6)	14.1 (23.1)
(1,1)	7.2 (2.6)	3.9 (1.0)	4.7 (1.2)	6.3 (1.8)
3. distance	1.776	1.843	1.827	1.796

Source: mid-18th century: see text. 1890-1910: Flandreau and Jobst 2005.

c. Cliques

The existence of symmetrical links between subgroups of nations enables to identify "cliques" in the network, i.e. groups of cities that homogeneously quote each other. Formally, a clique is a submatrix in the general network matrix that only contains ones. Table 3 lists the cliques by decreasing size starting with 5 city cliques (the largest ones in this specific network) and going down to 3. All cliques contain subsets of smaller cliques. They are not reported since only the biggest grouping does matter.

Two interesting issues emerge from this exercise. First, we come across high profile, leading financial centers cliques that bind together what may be called international centers. The largest, 5 and 4 country cliques may be seen as the infrastructure of the European settlement system. We see that the leading center(s) in Austria, England, France, Germany, Holland, Italy, Spain, were permanently connected to one another. This suggests that the European financial system in the mid-18th century was a remarkably well organized one. Interestingly, apart from Paris and Madrid, all the cities in these cliques were trading ports.

Table 3. Cliques in the Network

size	List of cities in clique				
5	Amsterdam	Cadiz	Livorno	London	Paris
5	Amsterdam	Cadiz	London	Madrid	Paris
5	Amsterdam	Genoa	Livorno	London	Venezia
5	Amsterdam	Genoa	Livorno	London	Paris
5	Amsterdam	Genoa	Lisboa	Livorno	London
5	Genoa	Livorno	Milano	Roma	Venezia
4	Amsterdam	Breslaw	Hamburg	Wien	
4	Amsterdam	Hamburg	London	Paris	
4	Amsterdam	Hamburg	London	Venezia	
4	Amsterdam	Hamburg	Venezia	Wien	
4	Augsburg	Frankfurt	Nurnberg	Wien	
4	Augsburg	Hamburg	Nurnberg	Wien	
4	Augsburg	Hamburg	Venezia	Wien	
4	Bologna	Firenze	Livorno	Roma	
4	Firenze	Livorno	Roma	Venezia	
4	Genoa	Livorno	Napoli	Venezia	
4	Genoa	Livorno	Napoli	Palermo	
3	Amsterdam	Antwerpen	Venezia		
3	Augsburg	Frankfurt	Leipzig		
3	Augsburg	Hamburg	Leipzig		
3	Breslaw	Hamburg	Leipzig		
3	Bolzano	Venezia	Wien		
3	Genoa	Livorno	Marseille		
3	Livorno	Lyon	Paris		
3	Foires	Livorno	Roma		

Source: Authors' computations

Another intriguing feature that already appears in 5 city cliques, is homogeneous linkages within linguistic areas. A striking case of this is the Italian 5 city clique that binds Genoa, Leghorn, Milan, Rome, and Venezia, as well as several 4 city cliques (Bologna, Florence, Leghorn, Rome, Genoa, Naples, Venice and Palermo in various combinations). We similarly find several German language cliques in the 4 city and 3 city groups: Augsburg, Frankfurt, Nurnberg, Vienna, Frankfurt, Leipzig, Hamburg, Breslaw. This stands in contrast with the situation for France and Spain, which do not display linguistic cliques. To understand why, it is interesting to take a closer look at the sub-matrices for Italy and France (Table 4a and 4b). As can be seen, the French system was quite centralized with two main hubs, Paris and Lyon, competing for quotes from all over the country. French cities typically did not connect with one another but only through the agency of Paris or Lyon or both. Lille stands out as an exception, sending quotes all over the country. This is in sharp contrast with the Italian situation where a myriad of centers branching with one another. The lowest number of Italian quotes for an Italian city is 4 (Milan) and the largest one is 10 (Leghorn). As a result, six Italian cities receive at least

6 quotes. In fact, this intensity of intra-Italian branching is a powerful factor explaining the decent record of in-degrees for Italian cities.

Table 4a: Italian language sub-network

quoting city \ quoted city	Ancone	Bari	Bergamo	Bologna	Bolzano	Firenze	Genoa	Lecce	Livorno	Messina	Milano	Napoli	Palermo	Roma	Torino	Venezia	Verona	# of cites quoted
Ancone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bari	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bergamo	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	1	0	4
Bologna	0	0	0	0	1	1	1	0	1	0	1	0	0	1	0	1	0	7
Bolzano	0	0	0	0	1	1	1	0	1	0	1	0	0	1	0	1	0	7
Firenze	0	0	0	1	0	0	1	0	1	0	0	1	0	1	0	1	0	6
Genoa	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0	1	0	6
Lecce	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Livorno	0	0	0	1	0	1	1	0	0	1	1	1	1	1	1	1	0	10
Messina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Milano	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	1	0	4
Napoli	0	1	0	0	0	0	1	1	1	1	0	0	1	0	0	1	0	7
Palermo	0	0	0	0	0	0	1	0	1	1	0	1	0	1	0	1	0	6
Roma	1	0	0	1	0	1	1	0	1	0	1	1	0	0	0	1	0	8
Torino	0	0	0	0	0	0	1	0	1	0	1	0	0	1	0	1	0	5
Venezia	1	0	0	0	1	1	1	0	1	0	1	1	0	1	0	0	0	8
Verona	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
# of times quoted	2	1	0	3	4	5	11	1	10	3	8	6	3	9	1	11	0	

Note: Empty lines refer to cities for which we have no bulletins yet. They are nevertheless included in the table as some of them are quoted by cities in the database.

Source: Sub-sets of complete base, see text.

Table 4b: French sub-network

quoting city \ quoted city	Bordeaux	Dunkerque	La Rochelle	Lille	Lyon	Marseille	Nantes	Nice	Paris	Rouen	Strasbourg	# of cites quoted
Bordeaux	-	-	-	-	-	-	-	-	-	-	-	-
Dunkerque	-	-	-	-	-	-	-	-	-	-	-	-
La Rochelle	0	0	0	0	0	0	0	0	1	0	0	1
Lille	1	1	0	0	1	1	0	0	1	1	0	6
Lyon	0	0	0	0	0	0	0	0	1	0	0	1
Marseille	0	0	0	0	1	0	0	0	1	0	0	2
Montpellier	-	-	-	-	-	-	-	-	-	-	-	-
Nantes	0	0	0	0	0	0	0	0	1	0	0	1
Nice	0	0	0	0	1	1	0	0	0	0	0	2
Paris	0	0	0	0	1	0	0	0	0	0	0	1
Rouen	0	0	0	0	1	0	0	0	0	0	0	1
Strasbourg	0	0	0	0	1	0	0	0	1	0	0	2
# of times quoted	1	1	0	0	6	2	0	0	6	1	0	

Notes and sources: same as Table 4.a

The contrast provided by the record of France and Spain on the one hand and the Italian and German area on the other hand is interesting. Unlike Italy and Germany, France and Spain, were

politically unified and centralized entities. This political centralization seems to have been mirrored with at least partial financial centralization, a result that seems to qualify Helleiner's claim of an irrelevance of political factors for monetary geography in the 18th century. On the other hand, it is interesting to observe the existence of monetary linkages that seem to anticipate future processes of unification in Italy and Germany. Historians have long noted that language provided a rationalization for the 19th century experiences of political unification. Our data suggests that language might have had an economic counterpart.

This finding may be put in relation with the well known result from gravity models of international trade that a common language boosts trade (e.g. Rose), and with the result in Flandreau and Jobst (2006), that increased trade raises the probability that two countries quote each other. The suggested interpretation would be that Italian and German cities were quite tightly integrated with one another already in the 18th century, thus providing a motivation for political and monetary integration in the 19th century, consistently with traditional OCA analysis. On the other hand, as suggested by the case of France, Spain, or England, where centralization was complete, higher degrees of monetary and financial centralization seem to have been made possible only by political unification. Whatever the channel through which this could take place the implication must be that the Westphalian state mattered for money.

d. Block modeling

We conclude the analysis by adjusting a block model to the data. Block models provide a summary picture of a given network by marshalling two criteria known as "Information" and "Clarity" to produce alternative groupings based on the way individuals (in this case, cities) relate to one another both within group and between groups (Flandreau and Jobst 2005). Two alternative groupings dominate (details on the output from the block-model are provided in the appendix) and the breakdowns they suggested are documented in Table 5. The first is merely a breakdown between two groups, a family of senior centers that are able to circulate their bills over a wide geographic area. They correspond to the cities starting with Amsterdam and ending with Madrid in the ranking provided by Figure 4. For these places, the number of in-degrees is never smaller than 11, and this group thus comprises cities whose bills are available in a "large" number of financial centers. The second group is a family of "junior" cities, comprising the rest: their bills have a modest circulation at best.

The other type of output with good statistical properties is the 7 groups block-model. First and foremost we have the core group of leading cities (Amsterdam, London, Paris, Hamburg), which we know were tightly integrated with one another by the mid-18th century (Neal 1991, Flandreau, Galimard, Jobst, and Nogues 2006). Other groups identified by the 7 categories block-model are interesting in the light of the discussion in the previous paragraphs. We see groupings where language and future political boundaries appear again as an organizing criterion. This is the case of group 2, or "Italian international centers" (Leghorn, Genoa, Venice), of group 5, or "Italian junior centers" (Rome, Naples, Bolzano, Florence, Bologna, Palermo, Turin, Bergamo, and the predominantly Italy's located Fairs), and again of group 6, or "German/Swiss financial centers" (Frankfurt/Main, Leipzig, Nuremberg, Geneva, Basel, Zürich). The inclusion of Geneva, on the other hand, suggests that religion may be one reason for the association.

Table 5. List of countries in Blockmodel: 2 groups and 7 groups

	2 Groups	7 Groups
Group 1	**Amsterdam, London, Paris, Hamburg, Leghorn, Genoa, Venice, Lyons, Vienna, Ausgburg, Milan, Cadiz, Madrid, Rome**	**Amsterdam, London, Paris, Hamburg**
Group 2	**Lisbon, Marseille, Naples, Bolzano, Florence, Bologna, Palermo, Turin, Bergamo, Fairs Frankfurt/Main, Leipzig, Nurenberg, Geneva, Basel, Zürich, Antwerpen, Breslaw, Rotterdam, Berlin, Dantzig, Barcelona, Copenhagen, La Rochelle, Lille, Rouen, Koenigsberg, Nantes, Nice, Riga, Saint-Petersburg, Sankt-Gallen, Smyrne, Stockholm, Strasbourg**	**Leghorn, Genoa, Venice**
Group 3		**Lyons, Vienna, Augsburg, Milan**
Group 4		**Cadiz, Madrid, Lisbon, Marseille**
Group 5		**Rome, Naples, Bolzano, Firenze, Bologna, Palermo, Turin, Bergamo, Fairs**
Group 6		**Frankfurt/Main, Leipzig, Nurnberg, Geneva, Basel, Zürich**
Group 7		**Antwerpen, Breslaw, Rotterdam, Berlin, Dantzig, Barcelone, Copenhagen, La Rochelle, Lille, Rouen, Koenigsberg, Nantes, Nice, Riga, Saint-Petersburg, Sankt-Gallen, Smyrne, Stockholm, Strasbourg**

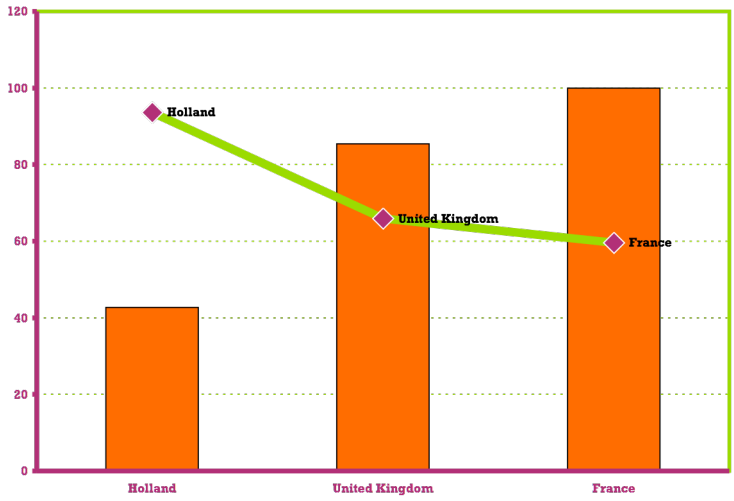
Source: Authors' computations from block-model: see text

There are also some interesting hybrid groupings that have geographical/historical relevance. This is the case of group 3, which comprises traditional 15th and 16th century financial centers with Bavarian and Lombardian connections and of Roman Catholic faith (Lyons, Vienna, Augsburg, Milan). Similarly, we find an Iberian family with a Mediterranean connection (group 4: Cadiz, Madrid, Lisbon, Marseilles). It is interesting to notice than in each case, France manages to get involved in these regional groupings through the agency of one city: Lyons, for the Lombard group, and Marseilles, for the Iberian one. Finally, group 7 is a catch-all category that includes the haven't (any quotes).

e- Extensions

Further inferences from the evidence discussed in this paper shall require combining it with additional data and exploring the determinants of foreign exchange listings. One would want to know, for instance, whether having an international financial center discourages or encourages the development of intra-national links. Another interesting issue is obviously that of the reasons why foreign exchange quotations concentrate on certain centers. A likely candidate is the importance of that center in trade. One the other hand, as suggested by Flandreau and Jobst (2005) in the context of the late 19th century, these factors interact with economies of agglomeration in a fashion that generate persistence.

Figure 6. Financial centrality (in-degrees in % of potential) and trade relevance (in million £)



Source: Trade data circa 1780, foreign exchange data: see text.

Figure 6 takes an admittedly crude look at this issue by showing total trade (measured in 1780) and financial preeminence (circa 1760) for the three leading centers of the time, Amsterdam, London and Paris. As seen, the relation is negative, and the Dutch florin was still the world most important currency at a time when its trade had been taken over by the UK and France. This suggests that history and persistence were important elements in shaping the contours of the international financial system. Of course, not all French trade was made from Paris and the evidence reported above of an association of French financial centers such as Lyons and Marseilles, with “foreign” financial areas shows that the aggregate trade of a country is a poor measure of the relevance of its financial centers since these centers in effect compete against one another for a share of the total. This holds of course, except if deliberate steps are taken by authorities or markets to concentrate trade in one capital, in which case

our study may have given us some hints on why, when and how certain governments and countries began to nationalize money and centralize financial power.

Conclusions

This paper has provided a study of the international monetary order in the mid-18th century. This age was, according to political scientist Helleiner, one when the "Westphalian state" refrained from meddling with money and thus we should expect to see the "pure" operation of market forces.

As we saw, the basic unit of analysis in international monetary relations was not the country with a financial capital (as would be the case in the late 19th century), but the city with a foreign exchange market, a sub-national entity. Some cities were essentially city states (e.g. Geneva), but others were part of broader political areas – Republics, Kingdoms, or Empires.

This perspective has revealed a number of intriguing features. There was quite a variety of domestic market organization from political areas to political areas. On the one hand we found one highly centralized country with only one market that was also the world's second most important foreign exchange center. This outstanding case was the UK.

On the one hand, we found some regional groupings with cultural or religious affinities where cities were densely connected to one another at a time when political linkages were still minimal. This was the case of the German or Italian areas. It is interesting to remark that countries emerged in the 19th century from these economic linkages, suggesting a two way causality between markets and states and between states and markets.

Finally, in between, were countries such as France or Spain with a limited number of leading centers and a variety of smaller ones dealing with regional connections. France for instance, had essentially two financial capitals, Paris and Lyons. Paris rising predominance seems to have a lot to do with the rise of its northern connections, London and Amsterdam, and to the relative decline of Lyons Italian and Austrian backyard. Regional centers were connected to either Paris or Lyons, but were on the other hand also connected with proximate regional groupings, such as the Iberian area for Marseilles. Thus the degree of national monetary integration in the 18th century was much more advanced but also much more contrasted than suggested by recent research. Understanding why should be the topic of future research.

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Appendix: Europe After Westphalia

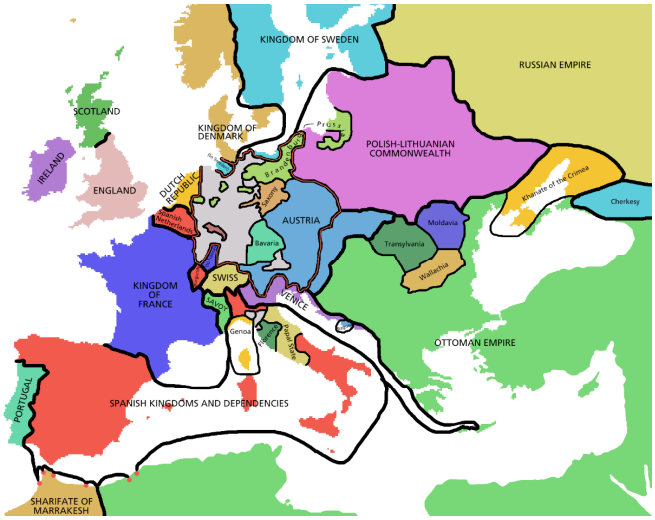

Figure 5. In-degrees and out-degrees.

Source: Authors' computations from database. Note: cities for which no bulletin is available are coded as -1.