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CROSS-CHECKING THE SOUND DATABASE WITH THE FRENCH *BALANCE DU COMMERCE* DATA

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¹ The authors thank Jan Wilhem Veluwenkamp and Ubo Kooijinga for sharing the SoundToll Register online project, Werner Scheltjens for sharing his work on merchandize names and units of measure in this database and Alexandre Aubourg for stellar research assistance with units of measure in the *Balance du commerce* database. This paper is part of the research project TOFLIT18 «Transformations of the French Economy through the Lense of International Trade, 1716-1821» funded by the Agence Nationale de la Recherche (ANR-13-BSH1-0005-03).

² PSL, Université

Economy?»), with Christine Riffart and Danièle Schweisguth, *Canadian Journal of Economics*, vol. 44, n°4, 2011 and he recently co-edited with Loïc Charles a special issue of the *Revue de l'OFCE*, “18th Century International Trade Statistics: Sources and Methods”, 2015/4, n° 140 (juillet 2015).

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1. Introduction

During the eighteenth century Europe set the cultural, political and economic conditions for its entry in the industrial era. While the role of international trade has been for a long time considered as a minor factor in the industrial revolution, the focus of economic history has changed somewhat during the last two decades. The emergence of a global perspective in economic history has led prominent scholars to account for the important role of international trade in the rise of Europe over other world regions.⁵ But whereas extra-European trade is comparatively well-known and has been the object of recent syntheses,⁶ intra-European trade has largely been neglected. The scarcity of works on foreign trade statistics of preindustrial times is all the more unfortunate as external trade flows are the single economic data that (some) early modern states have collected with the most care. Indeed, the first attempts at measuring foreign trade regularly can be dated back to the seventeenth century. From 1696 on, the English crown was able to collect a continuous series of customs data and release a yearly evaluation of the English balance of trade. The French royal administration created the *Bureau de la balance du commerce* in 1713. Its task was to produce a yearly document that detailed the French external trade and calculated its general balance. There was a pan-European move towards a more extensive and better measurement of external trade throughout the eighteenth century, with various countries gathering the same data through their central administrations. Annual series

⁵ Robert C. Allen. *The industrial Revolution in Global Perspective* (Cambridge University Press, 2009); John V. C. Nye, *War, Wine, and Taxes: The Political Economy of Anglo-French Trade 1689-1900*. (Princeton University Press, 2007) ; Kenneth Pomeranz, *The Great Divergence: China, Europe, and the Making of the Modern World Economy*, (Princeton University Press, 2000).

⁶ P.K. O'Brien and L.P. Escosura, eds., "The Costs and Benefits for Europeans from Their Empires Overseas," *Revista de Historia Económica (Second Series)* 16, no. 01 (1998); J.V. Roitman, O. Pétré-Grenouilleau, and P.C. Emmer, eds., *A Deus Ex Machina Revisited: Atlantic Colonial Trade and European Economic Development* (Brill, 2006).

have been located for Sweden from 1732, the Austrian Netherlands from 1759, Hamburg from 1733, Milan in 1762, 1769, 1778 and 1791, Venice from 1769/1770 onward, Portugal in 1776-77, 1783, 1789, and from 1796 onward, Spain from 1778 onward, etc.⁷ Research on trade of the British Isles is more advanced than for other countries. A recent book has renewed the research on Scottish trade in the eighteenth century⁸. A team coordinated by David Jacks, Kevin O'Rourke and Alan Taylor is currently gathering data on English and British trade from 1696 to the early twentieth century.

Despite this spurt of recent interest in early modern trade statistics, economic historians consider them as difficult to use. Issues of under-registration of trade because of smuggling and bad training of the personnel registering trade seem to make these data unreliable. One way to get around these criticisms is to compare two trade data sets and see whether they actually depict the same economic trend or not. Many of these data sources cover the same trade flows, registered by different administrative authorities. However, they did so from a different perspective. Moreover, the information gathered by these institutions often differed: some, like the Sound toll registers (further: STRO), measure trade flows by quantity, others, like the French bureau of balance of trade (further: FBT), by value.

Still, French Baltic trade as registered by the Danish authorities should mirror reports of the French authorities. Previous studies have provided such a cross-checking, either between the Sound and other places⁹, between different countries¹⁰, or even between different sources in the

⁷ Loïc Charles and Guillaume Daudin eds, *18th Century International Trade Statistics: Sources and Methods*, spécial issue of the *Revue de l'O.F.C.E.*, 2015/4, n° 140, juillet 2015

⁸ Philipp Robinson Rössner, *Scottish Trade in the Wake of Union (1700-1760): The Rise of a Warehouse Economy* (Stuttgart: Franz Steiner Verlag, 2008).

⁹ Guillaume Daudin and Pierrick Pourchasse, "Cross-Checking the Sound Database with the French Balance Du Commerce" (presented at the Sound Toll Registers online – to the test STR online as an instrument for historical

same country¹¹. Most of these studies present rather pessimistic results. This may be due in part to the rudimentary methods applied to the data. Even today, in the era of modern and standardized statistics reconciliation between mirror trade flows is still an issue, so perfect correspondence between eighteenth-century data should not be expected. Accordingly, our objective is more general: we are looking for some common trends and structures that may be identified. At the very least, we believe that our exercise in comparison would provide new information about the datasets and present directions for further research. A first, preliminary study on the subject, in which a number of goods was excluded because they were not translated from the original Danish, gave deceptive results.¹² For the present analysis, however, we have worked with an enhanced Sound Toll database and a bigger set of flows from the French side. We did not expect a perfect fit of the information given by the two databases, we are barely looking for common elements between STRO and FBT. We have applied a comparative methodology to both datasets in order to better understand the nature of the information they

research, Leuwarden (Netherlands), October 2010); Jari Ojala and Lauri Karvonen, “Assessing the Reliability of the Sound Toll Accounts: Comparing the Data to the Swedish and Portuguese Sources” (presented at the STRO conference, Groningen (Netherlands), October 25, 2012).

¹⁰ Philipp Robinson Rössner, *Scottish Trade with German Ports, 1700–1770* (Stuttgart: Franz Steiner Verlag, 2008), <http://www.steiner-verlag.de/programm/fachbuch/geschichte/mittelalter-und-neuzeit/reihen/view/titel/56561/print.html>; Loïc Charles, Ann Coenen, and Guillaume Daudin, “Comparing Early Trade Statistics: The Case of Austrian Netherlands and France from 1759 to 1791” (presented at the ESSHC Conference, Glasgow (United Kingdom), April 2012); Cristina Moreira et al., “Comparing Trade Flows between Portugal and Scandinavia: Methodological Lessons Arising from the Use of Multiple Sources” (presented at the Early trade statistics: What are they and why do we care, Paris (France), May 2014).

¹¹ Rössner, *Scottish Trade in the Wake of Union (1700-1760)*.

¹² G. Daudin and P. Pourchasse, “Cross-Checking...”, op. cit.

contain and to assess how economic historians could use them meaningfully.¹³ Another purpose of our work is to provide new tools and methodologies for the further development of comparative analyses of early modern trade databases.

In the next section we briefly discuss the features of the French dataset, which we have compared to STRO. In the third section, we present the methodology we followed in order make them comparable. In the fourth section, we critically assess the results of our comparative analysis.

2. The French Dataset

In France, a *bureau de la balance du commerce* was created in 1713.¹⁴ The bureau was a small unit: in addition to its director, originally one of the director of the General Farms (Fr. Directions de

¹³ The authors of this chapter are engaged in a project – TOFLIT18 – financed by the French National Research Agency (*Agence Nationale de la Recherche*). In the context of this project which will run from 2014 to 2017, they are actually developing a database that will contain information not only on the national trade flows (the only one available at the time we are writing this chapter), but also at the regional/port level. Because the latter type of data is much more precise and closer to the kind of information given by the Sound Toll, we are expecting to be able to reach a much better fit for the two sets of data in the future.

¹⁴ The following paragraphs are mostly based on L. Charles and G. Daudin, “La Collecte Du Chiffre Au XVIIIe Siècle: Le Bureau de La Balance Du Commerce et La Production Des Données Sur Le Commerce Extérieur de La France,” *Revue D'histoire Moderne et Contemporaine*, no. 1 (2011): pp. 128–55. This is the most recent and detailed reference on the bureau, but additional information on the bureau and the data it produced can also be found in : Michel Morineau, 1965, "La Balance du commerce franco-néerlandais et le resserrement économique des Provinces-Unis au XVIIIe siècle" *Economisch Historisch Jaarboek*, 30, 1965, p. 170-233; Jean Tarrade, *Le Commerce colonial de la France à la fin de l'Ancien Régime : l'évolution du régime de l'exclusif de 1763 à 1782*, Paris, PUF, 1972 ; Pierre Dardel, *Navires et marchandises dans les ports de Rouen et du Havre au XVIIIe*. Paris: SEVPEN, 1963.

Fermes), there were no more than four clerks for most of the period.¹⁵ It was put under the direct supervision of the Director of Trade, the most important official in the French economic administration after the controller general of finances, who accommodated the bureau in his Parisian house. Until 1781, the bureau held the task of computing the data and presenting them once a year to the controller general and the Council of commerce in a synthetic form, the *Objet général*. There was no significant change in the structure until the beginning of the 1780s. Necker, the new controller general of finances, wanted the bureau to become a more general centre of economic expertise. In the following years, its workforce rose steadily to seven in 1784 and more than a dozen in 1787. At that time, the bureau of the balance of trade was able to conduct wider economic surveys, most notably to prepare and, subsequently, evaluate the consequences the trade treaties France made with the newly born United States (1778), Russia (1785) and England (1786). However, the piling up of reforms and new tasks had a major negative effect: the bureau was overloaded and was no longer able to produce the French balance of trade within reasonable time. The French balance for 1782 was only released in 1786 and the balances for 1783 to 1786 were never completed.¹⁶ The bureau disappeared in 1791 altogether with the Council of commerce and most of the Ancien Regime's former administration, swept away by the revolutionary government.

How did the bureau create the dataset that was consigned in the *Objet general*? At the local level, the information was gathered by some 230 General Farms bureaus. They sent to Paris an extract, that is a summary made of a list of goods and their total quantities imported or exported at the end of each month. These extracts were then treated by the bureau: it added up the

¹⁵ In Ancien Regime France, taxes were farmed to private companies. The most important of them, which held a quasi-monopoly on taxes, was the General Farms company. It was in particular in charge of the collection of the various custom duties.

¹⁶ Before 1782, it took usually less than two years to complete the *Objet général*.

extracts by province (*généralités*) and proceeded to standardize the quantity units. Prices were sometimes recorded by the General Farms' employees, but not systematically. As the bureau wished to compute values rather than quantities, it sent to each province's chamber of commerce (or to the intendant when there was none) the list of goods asking the representatives of the merchants to provide price estimates or to check the price given by the General Farms local bureaux¹⁷. Economic historians have shown that prices included in the *Objet général* showed no systematical bias and were close enough to international prices (as given by the Amsterdam market price).¹⁸

Up to 1745, the *Objet général* consisted of several folders (*cabiers*), one for each *généralité*¹⁹. In these books, goods were classified in alphabetical order with their respective value – the quantities were also mentioned for some goods. Each entry was disaggregated according to the geographical area or country from which the goods came or went to²⁰. From the year 1746 to 1751 included, the books were made according to each country instead of the regional entity (likewise the goods were listed by *généralité* instead of country). Finally from 1752 to 1780, it took a stable design: the whole trade was listed by alphabetical order of goods name, with indication of

¹⁷ It must be noted that the bureau asked an average price or “just value” and was not concerned with registering the short term variations, see *Nederlandsch Economisch-Historisch Archief*, Pierre Bruyard papers, files 76-77.

¹⁸ See Michel Morineau, 1965, "La Balance du commerce franco-néerlandais et le resserrement économique des Provinces-Unis au XVIIIe siècle" *Economisch Historisch Jaarboek*, Vol 30, p. 183-184; Jean Tarrade, *Le Commerce colonial de la France à la fin de l'Ancien Régime : l'évolution du régime de l'exclusif de 1763 à 1782*, Paris, PUF, 1972, p. 770-771 ; Pierre Dardel, *Navires et marchandises dans les ports de Rouen et du Havre au XVIIIe*. Paris: SEVPEN, 1963, p. 20.

¹⁹ The number of the *généralités* or *Directions de Fermes*, since these two sub-divisions corresponded, has changed marginally across the eighteenth century, but it was 18 for most of the period.

²⁰ Country is a short-hand term for geographical regions: If some of these regions actually account for countries such as Sweden, Spain or Portugal, others were in fact including several countries such as England (England, Ireland and Scotland) or Guinea (whole Africa).

where the good went to or came from; information on the *généralité* was not recorded anymore.²¹ In the *Objet général*, the flows of trade were given in value only from 1752 to 1770, but quantities were also systematically recorded from 1771 onward.²² Following the 1781 reform, some changes occurred and, among other things, the list of countries was changed. These changes, however, were marginal, at least for the issue taken up in this paper²³.

At the present time, our database includes about 27 years, from 1750 to 1789 with occasional lapses, of French external trade. It includes a total of more than 150,000 flows – each flow being made of one specific type good described by an individual name, in a specific year, to or from a specific country. In the future the dataset will be expanded in two ways. First, more years – especially revolutionary and post revolutionary – (up to 1823) will be included. Second, we will include regional data, i.e. data on flows between French *généralités* and foreign countries.²⁴

3. Methodology

In this section, we document our methodology to make the two datasets, STRO and FBT, comparable (at least to some degree). Originally, both sources are of a very different nature, which makes a direct match completely impossible. On the one hand, STRO includes information that concerns ships and cargoes rather than flows. Moreover, the Danish authorities were registering the volume of the cargo rather than its value. On the other hand, in the annual

²¹ However, we can recover some of this information by using provincial registers, which have been partially preserved for several maritime provinces or *généralités*, such as Bayonne, Bordeaux, Caen, Marseille, Nantes, Rennes and Rouen. All together these provinces accounted for more than 80% of French external trade.

²² Before 1771, information on the quantities can be found in the provincial registers, where they were systematically recorded.

²³ For more details on these changes, see Charles and Daudin ‘La balance’, pp. 143-154.

²⁴ For more details on the state of progress of the project and the data to be included in the database in the near future, see <http://toflit18.hypotheses.org/>.

statistics of the French bureau of trade flows of trade are measured, not cargoes, and values are looked for rather than quantities of goods.

3.1. STRO

In order to match the two datasets, we have modified the data from STRO.²⁵ Basis for our modifications was a text extraction file (under .csv) from STRO dated November 3rd 2013. Two files included all the data we needed: the “ladingen.csv” file (including 4.25 million single-merchandise cargo registrations) and the “doorvaarten.csv” (including 1.5 million passages). We did not have to use the tax file. The file “all_places_standard.csv” included all that was necessary for the treatment of place names, including an impressive standardization of 21,576 place name variants into 1,704 standardized place names, 37 small and 15 big categories. Thanks to that, it was very easy to identify passages to or from France. From these data files, French trade with the Baltic between 1749 and 1795 was extracted, since the available merchandise level- data from the FBT are available from 1750 to 1789. This brought the number of cargo registrations down to 111,000.

The identification of goods was much more difficult than the identification of place names. The Soundtoll database project has started treating all the product denominations, but this is still work in progress. We were assisted by a professional translator and several colleagues to carry out the identification of goods. “Our” 111,000 cargoes included 5,218 different *products*. 24 appear more than 1,000 times, 163 more than 100 times, 602 more than 10 times. 3,217 were hapax used only once. These 5,218 different *products* were standardized into 470 Danish names; 2,535 product denominations (nearly 50%) were not identified, but they corresponded to only 3,018 cargo registrations (less than 3% of the total number of cargo registrations). The 470 Danish names were translated into 399 *merchandises* in French (and further normalized into 367 *merchandises*

²⁵ All the STATA programming is available from the authors.

normalisées). The final operation was to classify these 367 categories into 16 SITC-based sectors (see Table 1). The identification process for the products involved in French trade with the Baltic between 1749 and 1795 led to the following results: 13,530 cargo registrations (12%) were not classified; most of them consisted of ballast (2,193), “varied goods” (5,722) and “provisions” (977).

Table 1: Classification of goods

| | |
|------------------------------|----------------------------------|
| 0: Foodstuff, various | 0a: Foodstuff, European |
| 0b: Foodstuff, Exotic | 1: Beverages and tobacco |
| 2: Raw materials | 3: Fuels |
| 4: Oils | 5: Chemicals |
| 6: Manuf. goods, by material | 6a: Manuf. goods, linen |
| 6b: Manuf. goods, wool | 6c: Manuf. goods, silk |
| 6d: Manuf. goods, cotton | 7: Machinery and transport goods |
| 8: Misc. manuf. Goods | 9: Other (incl. weapons) |
| 9a: Species | |

Another issue is how to measure the size of the trade flows. As mentioned above, the Sound Toll Registers do not include the value of goods. A first option would be to use the information included about the value of the cargo toll paid since most of these were ad-valorem. However, besides the value of each good, the amount of tax paid depended also on the nationality of the owners of the cargoes (there was an exemption for Danish owners during the period of interest) and the nature of cargoes (different kind of products were taxed differently). Hence, it is extremely complicated, almost impossible in fact, to calculate the value of the cargo using only the toll assigned to it. This variable may however be used as a proxy, if only to check what kind of information it may give us.

A second option is to use the quantities given by the registers. In that case, the first issue is to provide some standardization of the units of measurement. 524 different names of quantity units are present in the sample we are studying. Recent research on the conversion into metric equivalents of pre-modern weights and measures helped us to unify several units and reduce their

total number to 114 standardized names of units of measurement²⁶. 3,852 cargo registrations were left without a recognizable unit of measurement: we treated them as “pieces”.

Acknowledging the difficulties of working with eighteenth-century units, the second step was to convert the 114 standardized names of units of measurement into a common metric equivalent.

.²⁷ All liquids volumes were transformed into weights by assuming a volumetric mass density of one. If that failed, the destination was used to identify the unit of measurement instead of the origin. If that failed again, we have used either external information or the means and modes in the existing data to identify units of measurement²⁸.

Table 2 sums up the conversion procedure. We were not able to convert 1,919 cargo registrations.

Table 2: Converting measure units

| | Scheltjens's procedure | Using destination instead of departure | Using other information | Total |
|-------------------------|------------------------|--|-------------------------|----------------|
| Weight | 48,533 | 914 | 18,474 | 67,921 |
| Number of pieces | 8,023 | 469 | 21,832 | 30,324 |
| Rigsdaler | | | 10,613 | 10,613 |
| Other | 11 | | 102 | 113 |
| Total | 56,567 | 1,383 | 51,021 | 108,971 |

²⁶ Werner Scheltjens, “The Volume of Dutch Baltic Shipping at the End of the Eighteenth Century: A New Estimation Based on the Danish Sound Toll Registers,” *Scripta Mercaturae – Zeitschrift Fu*

3.2. French balance of trade

Since it registers flows rather than cargoes, the French database is smaller than STRO. It is under STATA format and included around 150,000 observations in mid-August 2014. Only a limited part of these observations concern trade with the Baltic and identifying them is a bit tricky²⁹. Before 1733, the only designation found in the French balance of trade reports is “Nord”. It designates a region that comprises Sweden, Denmark, hanseatic ports (mainly Hamburg, Bremen, Lübeck and Danzig), Prussia and Russia. Trade with Denmark is identified separately from 1733, trade with Sweden from 1734 and trade with Russia from 1744. The first difficulty is that some of this trade did not pass through the Sound, such as the trade with Arkhangelsk, Hamburg, Bremen, Norway, Gothenburg and, more generally, the North and Arctic seas. There is also a category “Allemagne” (Germany) which includes land trade only³⁰. So it is not possible to identify trade with the Sound. After 1780, trade with Sweden, Denmark and Russia is still reported separately. “Nord” disappears and is replaced by “Quatre villes hanséatiques” (Hamburg, Bremen, Lübeck, Danzig) and Prussia. Trade with Prussia is indicated as being only by sea in the aforementioned F12/1834B archive document. Taking into account all trade flows potentially with the Baltic (i.e. Sweden, Denmark, Russia, “Nord”, “Villes hanséatiques” and Prussia), the French data include 15,004 observations, covering 26 years

²⁹ See the discussion in Pierre Jeannin, “Les Marchés Du Nord Dans Le Commerce Français Au XVIIIe,” in *Aires et Structures Du Commerce Français Au XVIIIe Siècle* (Lyon: Centre d’histoire économique et social de la région lyonnaise, 1975), 47–74; Pierrick Pourchasse, *Le Commerce Du Nord: Les Échanges Commerciaux Entre La France et l’Europe Septentrionale Au XVIIIe Siècle* (PU Rennes, 2006).

³⁰ On one document, the category is further specified as “l’Allemagne, la Lorraine et le Pays de Liège”, see. Bibliothèque municipale de Saint-Brieuc, fonds Gournay, ms. 87, folder n° 2. Trade with “Allemagne et Pologne” is indicated as being only conducted by land in Archives Nationales (Paris), F12/1834B, “Tableau estimatif du commerce...”.

between 1750 and 1789. Still, there is no way to differentiate trade with the Baltic from trade with Hamburg and Bremen – which was probably quite important. The only possible comparisons with STRO are for trade between France and Sweden (except Gothenburg), Denmark (except North Sea and Norway ports) and Russia (except Arkhangelsk). In the STRO dataset, this corresponds to the small categories “Sweden and Finland”, “Esthonia” + “Kurland” + “Livland” + “Russia around St. Petersburg” and the standard places “Stralsund” and “Greifswald” for Swedish Pomerania.

On the cargo designation side, the French database uses 3,320 designations for trade with the “Nord”. This number was reduced to 1,761 after correcting spelling mistakes and unifying similar forms. Ten goods are mentioned more than 100 times: *Marchandises* (goods): 205; *Eau de vie* (spirits): 141; *Mercerie* (haberdashery): 139; *Merrain* (staves): 136; *Vin de Bordeaux* (Bordeaux wine) 136; *Indigo* (indigo) 123; *Planches de sapin* (fir planks) 111; *Mâts* (masts): 108; *Huile d’Olive* (olive oil): 106; *Fer en barre* (iron bars): 106. Fifty-nine goods are mentioned more than 50 times. All goods are then classified into the same 16 SITC-based sectors that are used for the treatment of STRO.

In the French statistics, a value expressed in Livre tournois a monetary unit that would be transformed into the Franc during the Revolutionary era, was assigned to all trade flows . Only flows from thirteen years (1750, 1770-1777, 1779, 1780, 1782 and 1787) are also recorded in quantities. About 80% of the flows for each of these years record quantities, which makes 6,720 in total for the thirteen years. A large majority of these quantities are expressed in *livres* (pounds) (4,802 out of 6,720). Others are recorded in numbers (615), *muids* (a type of barrel) (241), *tonneaux* (another type of barrel) ((178), *barils* (barrels) (156), etc. Using the name of the merchandize and the place of origin most of these units could be translated in numbers and metric measures using

a variety of sources³¹. We have categorized some units of measurement as bundles when neither the corresponding weight, volume or number of pieces could be found: e.g. baskets of glasses, crates of citrus, etc.

Our work on the raw data allows us now to compare trade flows reported by FBT and STRO. However, crucial differences remain. Firstly, despite the fact that we aggregated the ports mentioned in STRO, the geographical areas registered in both sources do not match perfectly. Secondly and even more problematic, the flows extracted from each source are measured in different ways: values are predominant in FBT, mostly volumes in STRO (see above). Although we do not underestimate the methodological issues at stake here, it is a useful exercise to check what knowledge can be gained from the comparison of two sets of data, which *ceteris paribus* should both provide a similar evaluation of trade between France and the Baltic.

Three approaches were developed to build a useful comparison between the two sources. Firstly, the absolute volume of trade is compared, using values value for FBT and either number of cargoes, kilograms or collected taxes for STRO. Secondly, the analysis is refined by decomposing total trade into sectors for a given year or period. Finally, some reflections on

³¹ Including Wikipedia, Werner Scheltjens's work, <http://www.genefourneau.com/mesures.html>, <http://www.cnrtl.fr/definition/millerolle>, Doursther, *Dictionnaire universel des poids et mesures anciens et modernes*; Louis-Benjamin Francœur et al., *Dictionnaire technologique, ou Nouveau dictionnaire universel des arts et métiers, et de l'économie industrielle et commerciale* (Paris: Thomine et Fortic, 1828); Jacques Savary Des Brulons, *Dictionnaire universel de commerce* (Paris: Jacques Estienne, 1723); Harald Witthöft and Gerhard W. Göbel, *Deutsche Masse und Gewichte des 19. Jahrhunderts: Die Mass- und Gewichtseinheiten* (St. Katharinen: Scripta Mercaturae Verlag, 1993); Yvette Darcy-Bertuletti, "Tableau Des Mesures Les plus Courantes En Usage Dans Le Pays Beaunois [Table of the Most Widely Used Measurement in the Beaune Locality]," 2005, <http://www.beaune.fr/IMG/pdf/Metrologie.pdf>.

trends are provided by looking at the longitudinal evolution of trade throughout the observed period.

4.1. Comparing the absolute volume of trade

In Table 3, the absolute volume of trade in terms of kilograms, number of pieces, etc. as given STRO and FBT are compared. Some differences are expected, as the Sound Toll collectors and the French employees did not use the same units of measurement and the geographical coverage of both sources is not the same. Most of the time, the reported flows are quite different. In some instances there is an important, often massive gap. However, it must be stressed that some of these gaps make a lot of sense. First, as expected, both French exports to and imports from Denmark are hugely undervalued in STRO. Here we have a combination of trade flows that went to Norway directly, bypassing the Sound, and the fact that most of the Danish trade was free from taxes and therefore loosely measured by the fiscal administration in the Sound. Another source of discrepancy is the variation in measuring: items that are measured by the piece in FBT, may be measured by weight or *ad valorem* in STRO, and inversely. This suggestion might be tested by looking how individual goods, or types of goods, such as planks or poles are covered in the two types of sources.

Table 3: Absolute value of trade, 1750-1789 (-)

| | | Denmark | | Russia | | Sweden | |
|---------------------|-----------|-------------|------------|------------|-------------|-------------|-------------|
| | | FBT | STRO | FBT | STRO | FBT | STRO |
| Exports from France | Bundles | 208 | | 50 | | 3,613 | |
| | Kilograms | 70,092,128 | 23,113,600 | 68,041,336 | 81,677,504 | 123,220,336 | 62,321,928 |
| | Litres | 68,656,016 | | 11,898,402 | | 16,880,192 | |
| | Meters | 2,073 | | 29,261 | | 6,279 | |
| | Pieces | 6,232,975 | 16,600,235 | 1,322,931 | 11,714,780 | 4,925,995 | 12,808,564 |
| | Silver kg | 37,562 | 401,393 | 39,623 | 57,459 | 16,574 | 40,736 |
| Imports to France | Bundles | 1,964 | | | | 220 | |
| | Kilograms | 259,623,472 | 1,270,031 | 69,724,144 | 115,677,840 | 289,704,160 | 112,079,064 |
| | Litres | 4,038,574 | | 273,907 | | 2,551,001 | |
| | Meters | 7,285,050 | | 273,907 | | 17,345,048 | 11,150 |
| | Pieces | 9,239,616 | 700,267 | 1,371,481 | 3,653,125 | 9,445,241 | 2,803,068 |
| | Silver kg | 20,069 | 50 | 32,793 | 96,187 | 36,192 | 1,283 |

Notes: Years covered are 1750, 1771-1777, 1779, 1780, 1782, 1787 and 1789. Silver kg is the converted value of goods not covered in the other categories (when available).

Looking at individual industrial categories,³² we see that the discrepancy between FBT and STRO for the French imports from Denmark are concentrated in sector 2 “Raw materials”, which includes timber products (coming from Norway). All in all, though, there is not much there than can dramatically increase our trust in the pertinence of the comparison.

4.2. Comparing the sectorial composition of trade

Another way to compare the sources is to check the sectorial composition of trade. As to the French balance of trade, we have chosen to compute the shares of each sector in total trade by using the values indicated in the French source. For STRO, the picture is more complex. As it is impossible to add together kilograms, pieces and rigsdalers, we have selected three types of indicators: kilograms (Table 3 shows that this is the dominant measure), cargo taxes (although they are missing for 45% of the cargo registrations; in particular trade with Denmark is excluded) and number of cargoes.

³² The excel tables for each industrial sector are available on the website <http://toflit18.hypotheses.org/241>

Table 4: Correlation of industrial composition of trade, 1750-1789 (-)

| | Unit in 'converted' STRO | Denmark | Russia | Sweden |
|---------------------------|-----------------------------|---------|--------|--------|
| Exports from France | Kilograms | 0,64 | -0,01 | 0,07 |
| | Number of cargos | 0,41 | 0,24 | 0,19 |
| | Taxes | 0,64 | 0,58 | 0,62 |
| Imports to France | Kilograms | -0,12 | 0,67 | 0,02 |
| | Number of cargos | 0,19 | 0,83 | 0,08 |
| | Taxes | -0,06 | 0,89 | 0,04 |

Notes: Years covered are 1750, 1752, 1754, 1756, 1757, 1758, 1759, 1760, 1761, 1767, 1768, 1769, 1770, 1771-1777, 1779, 1780, 1782, 1787-1789. The units in the French source is always the value of trade

Like Table 3, Table 4 shows that FBT and STRO do not measure the same French imports from Denmark. Again, trade with Norway is probably part of the explanation. French imports from Sweden also seem very different. In all the other cases (French imports from Russia, and French exports), the data are more alike. For all French exports, it is the Sound taxes indicator that provides the best fit for the French sources. They are positively correlated for all three countries in the case of French exports. Moreover, they do a good job for French imports from Russia. It suggests that the Sound Toll Register taxes might be a reasonable indicator of trade composition.

Table 5: Industrial compositions of French exports, 1750-1789 (-)³³

| | Russia | | | | Denmark | | | | Sweden | | | |
|-------|------------|------------|------------------|----------------------|----------------------|--------------------|------------------|----------------------|----------------------|--------------------|------------------|----------------------|
| | FBT Values | STRO Taxes | Sound sources Kg | Sound sources Cargos | French source Values | Sound source Taxes | Sound sources Kg | Sound sources Cargos | French source Values | Sound source Taxes | Sound sources Kg | Sound sources Cargos |
| 0 | | 0% | | 0% | | | | | | 0% | | 0% |
| 0a | 1% | 4% | 5% | 19% | 3% | 3% | 7% | 22% | 3% | 8% | 13% | 20% |
| 0b | 50% | 35% | 8% | 9% | 40% | 38% | 14% | 5% | 58% | 44% | 68% | 11% |
| 1 | 26% | 36% | 8% | 32% | 41% | 49% | 48% | 32% | 20% | 33% | 8% | 27% |
| 2 | 11% | 13% | 76% | 16% | 10% | 3% | 26% | 7% | 13% | 3% | 8% | 8% |
| 3 | | | | | | | | | 0% | | | |
| 4 | 0% | | 0% | 0% | 1% | | 0% | 0% | 1% | 0% | 0% | 0% |
| 5 | 1% | 0% | 0% | 3% | 1% | 1% | 2% | 9% | 1% | 1% | 0% | 7% |
| 6 | 4% | 1% | 0% | 4% | 1% | 1% | 0% | 7% | 1% | 1% | 1% | 9% |
| 6a | 1% | 0% | | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 6b | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 1% |
| 6c | 2% | 0% | 0% | 0% | 1% | | | | 1% | | | 0% |
| 6d | 0% | | | | 0% | 0% | 0% | 0% | 0% | | | |
| 7 | 0% | | | 0% | 0% | | | 0% | 0% | | | |
| 8 | 2% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 1% | 0% | | 0% |
| 9 | 0% | | | 0% | 0% | | | | 0% | | | |
| ??? | 0% | 2% | 1% | 6% | 0% | 2% | 2% | 6% | 0% | 4% | 2% | 7% |
| Mixed | 2% | 9% | 2% | 10% | 1% | 4% | 0% | 10% | 1% | 4% | 2% | 9% |

Notes: Years covered are 1750, 1752, 1754, 1756, 1757, 1758, 1759, 1760, 1761, 1767, 1768, 1769, 1770, 1771-1777, 1779, 1780, 1782, 1787-1789. When no number is mentioned, no trade in that category is recorded.

Table 5 and Table 6 provide a closer look at the composition of French imports and exports. The main French exports are colonial foodstuffs (0b) and drinks (1, mainly wine and spirits) and, to a lesser extent, European foodstuffs (0a, including vinegar and mediterranean products (prunes, etc.) and raw materials (2, mainly indigo and salt – this last one being very important for French-Russian trade). If we concentrate on colonial foodstuffs and drinks (by far the two most important categories according to the French sources) two points needs to be underlined. Firstly, colonial foodstuffs as expected are usually more important in values and taxes than in kilograms and cargoes, as they are high value-to-weight goods. Secondly, the gap between the French source and the indicator of Sound taxes are of the same magnitude for the three countries. The category 0b weights slightly more in the French source (between 40 and 50%) than in the Sound,

³³ This stage allowed us to correct a mistake in the conversion of the *lispund* than made the “???” category represent 94% of French exports to Sweden in kg.

while category 1 weights slightly more according to the Sound tax registers (between 33 and 46 %) than in the French source. This suggests that the Sound administration goods from category 0b are more taxed in proportion to their values at departure (France) than goods from category 1. If such a result were confirmed, it would clearly show that the two sources provide the same kind of information on the composition of French-Baltic trade, a fresh and unexpected result.

The main French imports are made of European foodstuffs (0a, especially grain), raw materials (2, including wood) and manufactured products (6, including iron). Each country had its own specialty: Raw materials for Russia and Denmark, manufactured products (mainly iron and its derivatives) for Sweden. There are several odd features of our statistics that are interesting to reflect upon. First, according to the Sound registers a significant share of Danish exports to France was made of colonial goods and drinks: that seems odd. There are three plausible explanations. The simplest is that it is an error in STRO – a large cargo of coffee wrongly registered might be enough to explain a large part of this difference. It is not rare in STRO to see errors in the direction of trade. Another explanation is that the cargo(es) did not go to France, but to other country(ies). Finally, it might be a case of falsification of the registers to carry goods from France at a better tax rate. Similarly, STRO registers a significant proportion of linen in the Swedish exports to France. Here, it might be a more obvious case of falsification since we know linen goods were coming from German states (the only significant exporter of these goods in the Baltic area), but maybe the tax rate was significantly lower for Sweden exports. Re-exports from Swedish Pomerania are another possibility. Finally, the discrepancy between the proportion of Swedish exports in iron and iron wares measured by the French balance of trade, might be explained by the fact that some of this trade was coming from Gothenburgh rather than Swedish Baltic ports.

Table 6: Industrial compositions of French imports, 1750-1789 (-)

| | Russia | | | | Denmark | | | | Sweden | | | |
|-------|----------------------|--------------------|------------------|----------------------|----------------------|--------------------|------------------|----------------------|----------------------|--------------------|------------------|----------------------|
| | French source Values | Sound source Taxes | Sound sources Kg | Sound sources Cargos | French source Values | Sound source Taxes | Sound sources Kg | Sound sources Cargos | French source Values | Sound source Taxes | Sound sources Kg | Sound sources Cargos |
| 0a | 4% | 2% | 13% | 6% | 22% | 7% | 39% | 12% | 2% | 3% | 8% | 4% |
| 0b | 0% | 0% | 0% | 0% | 0% | 29% | 7% | 3% | 0% | 2% | 0% | 0% |
| 1 | 1% | 8% | 1% | 1% | 0% | 35% | 10% | 7% | 0% | 2% | 0% | 1% |
| 2 | 62% | 70% | 65% | 50% | 53% | 10% | 8% | 24% | 4% | 8% | 28% | 25% |
| 3 | 0% | 0% | 0% | 0% | 1% | 1% | 9% | 2% | 1% | 5% | 15% | 7% |
| 4 | 14% | 6% | 5% | 5% | 1% | | | | 0% | 0% | 0% | 0% |
| 5 | 2% | 1% | 0% | 1% | 3% | 0% | 1% | 2% | 2% | 2% | 1% | 5% |
| 6 | 10% | 7% | 15% | 20% | 13% | 12% | 11% | 19% | 90% | 56% | 41% | 47% |
| 6a | 2% | 2% | 0% | 3% | 0% | | | 0% | 0% | 19% | 4% | 5% |
| 6b | | 0% | 0% | 0% | 0% | | | | | 0% | 0% | 0% |
| 6c | 0% | | | | 0% | | | | 0% | | | 0% |
| 6d | 0% | | | | 4% | 1% | | 0% | 0% | 0% | | 0% |
| 7 | 3% | 0% | 0% | 5% | 2% | 0% | 0% | 1% | 0% | 0% | 0% | 1% |
| 8 | 0% | 0% | 0% | 0% | 0% | | | 0% | 0% | 0% | 0% | 0% |
| 9 | | 1% | | 4% | 0% | | | 0% | 0% | 1% | 1% | 1% |
| 9a | | | | | 0% | | | | 0% | | | |
| ??? | 0% | 1% | 0% | 3% | 0% | 5% | 15% | 25% | 0% | 2% | 1% | 3% |
| Mixed | 1% | 2% | 0% | 2% | 1% | 2% | | 4% | 0% | 0% | 0% | 1% |

Notes: Years covered are 1750, 1752, 1754, 1756, 1757, 1758, 1759, 1760, 1761, 1767, 1768, 1769, 1770, 1771-1777, 1779, 1780, 1782, 1787-1789. When no number is mentioned, no trade in that category is recorded.

4.3. Comparing the chronological evolution of trade

The last approach to compare the data provided by the two sources is to examine the evolution of trade throughout the period, i. e. the trend. Table 7 confirms that French exports are easier to reconcile in the two sources than French imports, except French imports from Russia. Besides, the indicator of the Sound taxes tracks the value from French sources much better than weight or number of cargoes, which is a confirmation of the result we obtained in the last two sections. We have selected two series for illustration. Figure 1 gives the best fitting series (French imports from Russia, using Sound Toll taxes) and Figure 2 gives not-so-good fitting series (French exports to Sweden, using Sound Toll taxes).

Table 7: Correlation of the evolution of French trade, 1750-1789 (-)

| Sector | Denmark | | | Russia | | | Sweden | | | |
|--------------|--------------|------------|------------|------------|-------------|------------|------------|-------------|-------------|-------------|
| | Kg | Nbr | Taxes | Kg | Nbr | Taxes | Kg | Nbr | Taxes | |
| Exports | 0a | .69 | .84 | .85 | .40 | .73 | .79 | -.17 | .27 | .17 |
| | 0b | .41 | .49 | .44 | .27 | .38 | .29 | -.20 | .45 | .48 |
| | 1 | .85 | .84 | .80 | .54 | .47 | .53 | -.05 | | .08 |
| | 2 | .14 | .80 | -.20 | -.33 | -.26 | -.20 | -.23 | -.01 | -.06 |
| | 6 | .59 | .68 | .42 | .36 | .62 | .36 | -.09 | .10 | |
| | 8 | -.36 | -.09 | -.75 | | -.38 | .82 | | -.38 | -.43 |
| | Total | .48 | .64 | .70 | -.27 | .47 | .46 | -.21 | .27 | .31 |
| | Imports | 0a | -.33 | .08 | -.25 | .28 | .31 | .19 | -.02 | -.18 |
| 0b | | | | | | | | -.58 | | -.88 |
| 1 | | | | | .53 | -.44 | .20 | | | |
| 2 | | -.61 | -.14 | .45 | .50 | .78 | .85 | .16 | .54 | .57 |
| 4 | | | | | .88 | .77 | .85 | -.13 | -.09 | .05 |
| 6 | | -.13 | .13 | .11 | .89 | .80 | .59 | -.11 | -.10 | -.11 |
| 6a | | | | | .52 | .72 | .73 | .09 | .76 | .22 |
| Total | | .11 | .13 | .27 | .62 | .81 | .84 | -.12 | -.07 | -.09 |

Notes: Years covered are 1750, 1752, 1754, 1756, 1757, 1758, 1759, 1760, 1761, 1767, 1768, 1769, 1770, 1771-1777, 1779, 1780, 1782, 1787-1789. The units in the French source is always the value of trade

Figure 1: Total French imports from Russia, 1750-1795

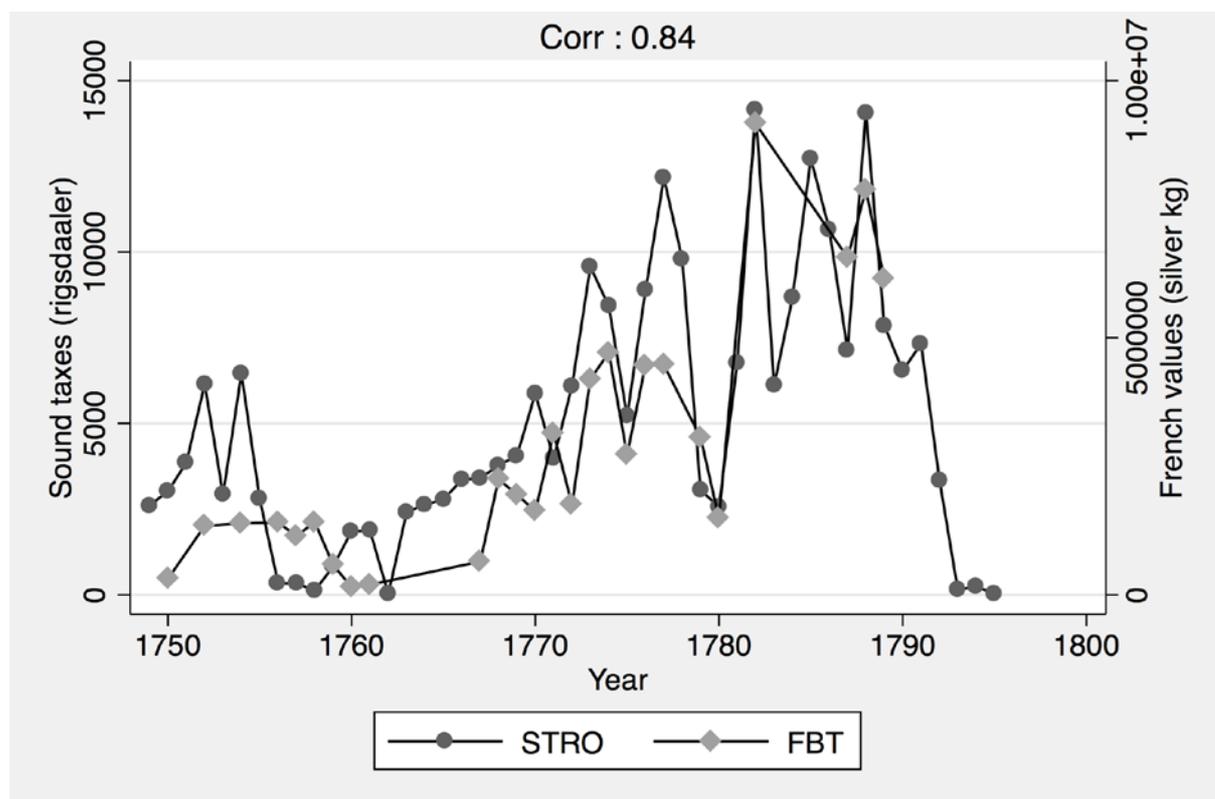
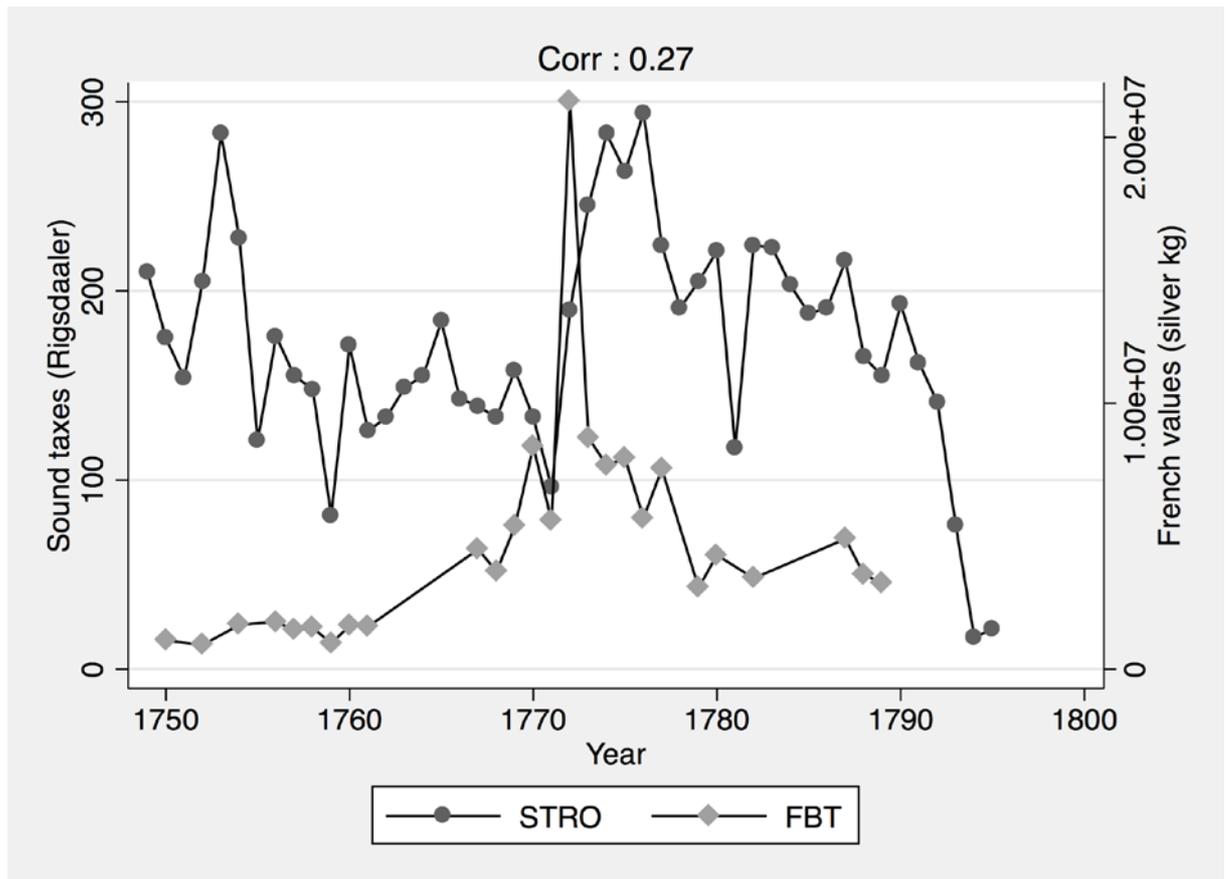


Figure 2: Total French exports to Sweden, 1750-1795



Both the tables and the graphics offer interesting information on our sources. First, we can see that the low correlation of French statistics to Sound taxes is not due to the presence of extreme values – it is visually evident in figure 2. Moreover, correcting for those by removing the highest and lowest 5 percent observations does not improve the fit by much for the other series as well. There seem to be fundamental differences in the series, except French exports to Denmark and French imports from Russia. In the case of French trade with Sweden and French imports from Denmark, the most likely explanation is that a large part of the trade escaped the Sound statistics: a large part of Danish exports to France consisted in Norway's timber and a significant share of Swedish trade to and from France went through Gothenburg. Conversely, the good correlation of both sets of data for French exports to Denmark and Russian trade

corresponded to routes that essentially went through the Sound: While France imported wood from relatively inhabited and poor Norway, its colonial goods and drinks went to denser and richer areas in Copenhagen and its surroundings.

In this chapter, we have presented two sources of French-Baltic trade flows in the second part of eighteenth-century, the French balance of trade (FBT) and the Sound Toll Registers Online (STRO). Despite their difference in nature, we have built a comparison between these two sets of data. Although a lot of methodological issues that we opened have not been cleared at this stage of our research, it is significant to note that we have been able to produce some fresh and interesting results from this exercise.

A first and important conclusion is that in the context of the French-Baltic trade physical quantities are not a good proxy for economic values. The comparison of the flows registered by STRO in physical quantities (and converted to volumes) and the French data registered in values is disappointing. The two series do not match, whatever approach we used, and we have not been able to extract valuable economic information from the comparison. The same is also true for the number of cargoes: even if the match is slightly better than with kilograms, it does not make a lot of sense. Conversely, the Sound Toll Registers tax indicator is a reasonable proxy for the flows' values measured by the French bureau. Interestingly, that is true whether we test the comparison for the total volume of trade for each country, for the sectorial composition of trade or for the dynamics of trade. By looking at the sectorial composition of trade, we have been able to trace some issues with STRO. It seems that the employees of the Sound (or the retranscribers) made significant mistakes when writing the ledgers. Consequently, the Sound registers should be used with caution when working on relatively small sample – such as French trade to and from one of the Baltic countries. On the whole, the French data seemed more consistent, or at least we were not able to spot significant bias in the information it contains.

Although, the present article is mostly concerned with methodological issues, it should be underlined that it has also produced some positive results: Norway accounts for a significant part of French imports from Denmark, but it is not the case for French exports to the same country. It is also clear that, while French exports to each of the Baltic countries share a similar structure and are dominated, in terms of value, by wine and colonial goods, there is a strong differentiation of French imports from these countries: Swedish exports are made almost exclusively of iron and its derivatives, Danish exports are made mostly of wood coming from Norway and to a lesser extent of European foodstuff from Denmark and Russian exports are dominated by primary goods.

A way to deepen the analysis would be to use more local data from ports rather than countries. This has not been possible within the scope of the present article, which primarily serves as an example for more the detailed analyses that will become possible in the near future, as more and more French data become available.