DOMESTIC TRADE AND MARKET SIZE IN LATE EIGHTEENTH CENTURY FRANCE

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This paper tests whether smaller domestic markets can explain why France industrialized more slowly than Britain. To do so, it uses the *Tableaux du Maximum*. The paper begins by presenting this source and then checks if the data from the source are plausible using a logit theoretical gravity equation. The results of this gravity equation are then employed to compute the expected market size of specific supply centres. Even if differences in real, nominal and disposable income are taken into account, some French supply centres had access to domestic markets that were larger than the whole of Britain.

Introduction

Demand factors are not a popular answer to the perennial question of why was Britain first to experience an Industrial Revolution and why other countries such as France lagged behind.[1] Yet growth models have shown that population and market size might be crucial variables to explain technical progress. Larger populations and larger markets may conceivably increase economic incentives for innovators, multiply the number of ideas that can be productively combined or encourage the division of labour, the payment of set-up costs, the rise of the factory, or the formation of industrial districts conducive to agglomeration economies.[2]

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[1] Demand for new goods was certainly important in the Industrious Revolution, which paved the way for the Industrial Revolution (De Vries, *Industrious Revolution*).

[2] Kremer, "Population Growth", Galor, "Unified Growth Theory", Romer, "Endogenous Technological Change", Grossman and Helpman, *Innovation and growth*, Desmet and Parente, "Bigger is Better", Krugman, *Geography and Trade*, Murphy, Shleifer, and Vishny, "Income Distribution", Smith, *Wealth of Nations*, Yang and Ng, "Specialization".

But if market size matters, how do we explain the fact that factories and technological innovation first appeared in Britain, where the population was much smaller than in France. After all, Britain had 10 million inhabitants versus 28 million in France in 1791.[3] A ready answer is that the population of nations is not relevant. If size intervenes through agglomeration effects, by increasing the potential reward to innovation or by allowing increased division of labour, then one should look rather at the purchasing power of potential customers for specific production centres. That is the aim of this paper.

France had higher trade costs than Britain due to smaller density, geography, internal barriers, limited development of new methods of distribution and more limited investment in transport infrastructures, especially canals.[4] Still, numerous authors have shown that market integration was crucial in explaining the evolution of agriculture. Jean Meuvret has highlighted the paradoxical role of the development of grain markets in increasing price volatility during the reign of Louis XIV.[5] George Grantham and Philip Hoffman have underlined the positive role of the development of urban markets in increasing productivity in agriculture during the 18th century.[6] I have argued that Smithian mechanisms were important to French growth in general in the 18th century.[7]

This paper shows that some French production centres had access to domestic markets that were as large as Britain as a whole and that had at least the same aggregate purchasing power at the end of the 18th century. Measuring the scope of these markets is made possible by an extraordinary source, the "*Tableaux du Maximum*", which was assembled in 1794, during the French Revolution. The *Tableaux* give information on trade links between 552 districts in France for fifteen different

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[3] Roehl, "French Industrialization". Crafts, "Exogenous or Endogenous Growth?", p. 760, underlines the difficulties of the size argument.

[4] Szostak, *Role of transportation*. However, there had been progress during the 18th century, such as the diffusion of semi-professional carriers (Meuvret, *Commerce*, p. 63).

[5] Meuvret, *Commerce*, vol. 1, p. 186 and vol. 2, p. 120 and 133 and Grantham, "Meuvret", p. 188.

[6] Hoffman, *Growth*, Grantham, "Espaces Privilégiés". Of course, France was not exceptional in this importance of urban markets for agriculture. See for example Parker, *America*, pp. 161-80.

[7] Daudin, *Commerce et prospérité*.

goods categories. There is no equivalent source for Britain or other pre-modern economies.[8] And they turn out to be more useful than grain prices for understanding the Industrial Revolution, since they yield specific information on textiles and hardware goods.

The usual proxy for potential market size is the sum of the size of accessible markets divided by trade costs.[9] We do not know enough about trade costs to undertake such a computation for the 18th century. This paper approximates potential market size by the sum of the size of markets that are being reached by a product. This measures the potential outlet for innovation that can be accessed without paying the cost of setting up new trade relations, such as building and maintaining trade routes, organizing regular transport services, finding trade partners, and organizing the dissemination of information.[10] As such, it is a lower-bound estimate of potential market size.

The paper begins by discussing the *Tableaux* and the data that can be derived from them. The paper next checks if the data are plausible by comparing the *Tableaux* to other sources and by using a logit theoretical gravity equation. The results of this gravity equation are then used to compute expected market size for specific supply centres. It turns out that some French textile and high value-to-weight goods supply centres had access to domestic markets that were at least as large as the whole of Britain. External markets probably did not make a large difference before 1793.

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[8] It is comparable to the railroad transport databases developed from the late 19th century and used in Berry, "Spatial Structure" and Wolf, "Border effects".

[9] Harris, "Localization of Industry". Redding and Venables have shown that this can be derived from a theoretical economic geography model and that it has some explanatory power for cross-country income differences: Redding and Venables, "International Inequality".

[10] The importance of set-up costs explains the development of nodal points: see Lesger, *Amsterdam market*. It plays an important role in explaining instability in grain prices during the reign of Louis XIV: Meuvret, *Commerce*, vol. 1, p. 169, 174-75 and vol. 2, p. 128 and Grantham, "Meuvret", p. 196. The importance of these costs for modern international trade has been highlighted in recent work: Bernard and Jensen, "Why Some Firms Export", Evenett and Venables, "Export Growth".

The laws of the Maximum

On 4 May 1793 the French Revolutionary government decided to fight inflation by imposing a price ceiling on grain and flour, the so-called Grain Maximum.[11] Local authorities in the county-sized departments that made up France (there were 87 of them) were to impose uniform maximum price for grain and flour throughout their territory. This legislation did not satisfy the government. Only output prices were capped: inflation in input prices went unchecked, jeopardizing production. Grain was supposed to be sold at the same price throughout each department, lowering the incentive to move grain from producing areas to consuming ones. As a result, on 29 September 1793, the French government decided to impose price ceilings on wages and 38 types of goods at the district level. There were 3 to 9 districts per department (see Figure 1). This was called the first General Maximum. It still had the flaw that maximum prices were fixed according to the interests of each districts: local authorities fixed the prices of the goods their district produced too high and the prices of the goods their district consumed too low. The law thus had to potential to block trade altogether.

The government quickly decided to solve that problem by setting up the second general maximum in November. This law might seem as the typical result of governmental hubris. It was trying to mimic the way the French government thought a market economy should work. To compute the "right" price, districts were to send to the office of the Maximum in Paris (part of the General Subsistence Commission) a standardized list of all the goods produced or imported from abroad, along with their prices in each producing or importing district in 1790 increased by one-third. Based on these data, in February 1794 the office of the Maximum constructed a price list of all the goods produced or imported in France: the national maximum table (*Tableau général du Maximum*). On February 23, this list was presented to the Convention (the national legislative and

[11] For the Maximum, see Le Roux, *Commerce intérieur*, p. 21-33 and Caron, *Maximum général*.

constitutional assembly) and then sent to all districts.[12] Districts were to use a standardized formula to compute the justified maximum price for each good "usually sold in their territory". The selling price was to be equal to the production or importation price, plus transport costs and wholesale and retail trading profits of 15 percent.[13] These local maximum tables (*Tableaux du Maximum*) were then to be sent to Paris within ten days; they arrived piecemeal throughout the spring and the summer 1794.[14] The law was repealed in December 1794 and the data collection exercise remains unique.

Many goods, but not all, were subject to the Maximum, and grains had their own special Maximum. Fresh fruits and vegetables, animals, shoes, furniture, earthenware were not given prices ceilings. Some districts added these goods to their *tableaux*, but they are the exception. Silk was subject to the law, but it was dropped in spring 1794, when the government decided that, being a luxury good, it did not warrant price controls. The initial list of twenty goods categories officially governed by the Maximum is given in Table 1. The included goods represented more than two third of French industrial value-added, along with a sizeable part of agricultural value-added.[15]

These categories are not completely coherent. For example, raw cotton is part of miscellaneous consumption and production goods (*épiceries et drogueries*) while raw wool and linen are listed with wool and linen cloths. Alcohols are part of miscellaneous consumption and production goods rather than drinks. However, these categories have the advantage of consistency: nearly all national agents (*agents nationaux:* local representatives of the state that had to collect the information) followed them when drawing up their districts' local maximum tables (*Tableau du Maximum*).

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[12] This list looks like a large paperback. There are two copies in the Archives Nationales: A. N. AD/XI/75 and AD/XVIII/C/315. Reproductions are available from the author.

[13] Transport costs were to be, for 100 *livres* over one league: 4 *sous* on main roads, 4 *sous* 6 *deniers* on other roads, 2 *sous* up a river, 9 *deniers* down a river and 1 *sol* 9 *deniers* on a canal. See Le Roux, *Commerce intérieur*, p. 243-93.

[14] Ibid., p. 46, quoting Lefebvre, *Études orléannaises*, p. 306.

[15] Daudin, *Commerce et prospérité*, p. 39, 439-59.

The *Tableaux du Maximum*

Most districts complied and sent to Paris at least some documents.[16] But not all of them listed the nineteenth categories of goods required by the law (excluding silk). Nearly half did, and 70 percent included all the main goods categories (see Table 2, which gives the inventory of the local maximum tables – the *Tableaux du Maximum* – in the French National Archives, based on Thomas Le Roux's work).[17] Apart from the Meurthe department – which *tableaux* are completely missing – and the Pyrennées Orientales department – where only one nearly complete *tableau* for can be found – at least one full tableau from each mainland French department is in the National Archives. The evidence covers most of France (see Figure 1).

The *tableaux* range in size from small books to large posters, printed or hand-written, and in length from a handful of pages to more than three hundred. Yet most of them provide eight columns with the information requested by the law plus miscellaneous comments. Table 3 presents the typical column headings of the *tableaux.* Picture 1 gives the first page of a *tableau* for illustration.

Although the *tableaux* were drawn up in spring 1794, they were supposed to reflect prices and consumption back in 1790, before the economic troubles that accompanied the Revolution. National agents were to list goods that were "usually" consumed in their district. The whole point of the exercise was to return to the time before inflation and the disruption of trade.

The data

French historians interested in the study of prices had serious doubts about the value of the *tableaux.* Certainly, the prices they list should be treated with caution. Computation errors and typos are probably numerous, transport cost computations partly arbitrary (even if a formula was imposed by the law, it was not easy to compute gross weight and to take into account the exact

[16] See Le Roux, *Commerce intérieur*, p. 35-73.

[17] Ibid., p. 41 along with personal research. The tableaux are to be found in the French National Archives $F^{12}1516$ to $F^{12}1544^{52}$.

route taken) and the production prices doubtful[18]. Yet, some prices are still useable. For example, the meat prices given by the Maximum laws have been plausibly used to study price differences in France. [19] Furthermore, once one leaves prices aside, these documents still provide long list of the origin of goods consumed in many districts in France. The paper shows below that, despite their shortcomings, these lists are reliable enough to be used for the study of the French domestic market, as Margairaz and Le Roux have already argued.[20]

Thomas Le Roux wrote a book on the subject based on data collected from *tableaux* in 62 districts, which formed a representative sample of all the districts in France. He collected a list of all the districts supplying these 62 districts with 14 categories of goods (see Table 1). For each of the 62 districts, he then maps the number of goods categories supplied by a much larger set of districts –552 in all. The results, according to Le Roux, demonstrate the beginning of a national market in the area surrounding Paris. In addition, he argues that France was divided into four regional markets, two of them dynamic (around Paris and the Rhône river) and two of them archaic (the French maritime periphery and the South-West).[21]

Le Roux reached his conclusions through a qualitative examination of cartographic evidence. They can be refined with a quantitative analysis. One additional way to improve on what Le Roux did would be to take into account differences in the transport and marketing costs of different goods. This paper does both and hence goes well beyond Le Roux's work.

It also makes use of new archival data, since I could not access Le Roux's original data. My sample is composed of 88 consuming districts, each chosen at random in one specific department among the districts having a full *tableaux*.[22] Where possible, I have excluded districts already

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[18] Lefebvre, *Études orléannaises*, p. 306.

[19] Margairaz, "Dénivellation des prix".

[20] Margairaz, "Melun", Le Roux, *Commerce intérieur*.

[21] Ibid., pp. 289-93.

[22] Excluding Meurthe and Corsica, which *tableaux* are unavailable. For Pyrénées Orientales, I selected the most complete *tableau*, Céret's.

studied by Le Roux in order to minimize redundant collection of data. Keep in mind that a district *tableaux* lists goods consumed there along with their origin. For each consuming district, I have extracted from the *tableaux* a list of districts mentioned at least once as supplying it with goods in each goods category. I did not record the number of different goods each district supplied inside each goods category, as that would have been a very imperfect quantitative measure of trade flows anyway. The data are qualitative, and are coded simply with zeros and ones.

The collected data give goods category specific information for 7 of le Roux's districts and 81 others, for a total of 88 consuming districts. Because all consuming districts supplied themselves with some goods, all consuming districts are also "supplying districts". 439 additional districts supplied these 88. There are only 25 districts for which neither consumption nor supply data are available. The sample covers most of France (Figure 2) and yields a database with 728,640 observations (Table 4). The indicator variable of interest is whether district A supplied district B with any goods from goods category C. In many instances there was of course no trade.

Checking the data

Before exploring the question of market size, it is important to check whether the data are plausible. There are a number of potential problems. The most likely and most troubling is that the data might reflect not the economic realities but the zeal of the national agents. The *Tableaux* are the result of three different operations, each of which was an occasion for errors: establishing the production tables in every districts; gathering the production tables and completing them in Paris to write the national maximum table (*Tableau général du Maximum*); and setting up the local maximum tables (*Tableaux du Maximum*) in every district.

To begin with, not every district submitted its production table. The central administration responsible for the application of the Maximum (the General Subsistence Commission) had to fill in missing data by asking Parisian merchants. In particular, the Commission had to complete the production and price lists of the most important districts that had not answered, including Nantes, Bordeaux and Lyon.[23] Some goods were still missing from the national maximum tables (*Tableau général du Maximum*). As a result, local districts included them using prices information coming either from direct inquiries in the producing or importing districts or from local traders.

National agents were nominated by the government to oversee the functioning of district administrations starting in December 1793. They were certainly willing to collaborate with the government for the application of the Maximum, and were given extensive powers. Still, some agents were less zealous than others. They were supposed to list only goods usually consumed in their district, but a small number of agents actually listed almost all individual goods from the national maximum tables (*Tableau général du Maximum*). In general, it seems that national agents tried to list the goods that were usually sold in shops in their district, or sometimes simply in their municipality. They would omit goods brought in by peddlers or purchased by consumers in adjoining districts. Certainly, they all did not have the same notion about what the size of a trade flows would have to be to warrant a good's inclusion in the local maximum tables. The following statistical exercises correct for this difficulty by using district-level fixed effects.

A potentially more serious problem would arise if all national agents had the incentive to distort the data in the same way, for example by exaggerating or minimizing the list of the goods that were consumed in their districts. Yet it is not clear what this systematic incentive could be. To begin with, because they were nominated by the central government they might not have taken the interests of their district at heart. Even if they had done so, they would presumably have increased the prices of the goods their districts were producing and decreased the prices of the goods they were consuming. They could have exaggerated the prices of the goods their districts were producing (despite the fact that it would be double-checked by the General Subsistence Commission), but that would not have changed the data we are looking at. It was difficult to reduce the price of the goods their districts were consuming. It was to be computed according to a strict formula taking into account transport costs and trade profits. The computations were double-

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[23] Le Roux, *Commerce intérieur*, p. 58-61.

checked by the General Subsistence Commission. They only way they could have distorted our data would have been by lying about the origin of the goods in order to minimize imputed transport costs. That would not be easy because they were supposed to pick goods in the national maximum table and differentiate them by origin. But, even if the national agents had actually distorted the data in this way, it would reinforce our conclusions because it would lead to an under-estimation of the trading distance and hence of the size of French markets.

The implied production data

Le Roux, who has examined a number of precise differences between specific *tableaux*, argues that the data are persuasive and generally reflected real differences in sales in each districts. For example, very detailed *Tableaux* generally came from districts including a large town. Very sparse *Tableaux* generally came from rural districts.[24] However, he did not compare the data with other contemporary evidence. To do so, I have drawn the "supply maps" implied by the *Tableaux* by assuming that the number of consuming districts out of the 88 supplied by each supplying districts in each goods category should be a reasonable proxy of the production or importation level in each supplying district. I have then compared them with data coming from late 18th century industrial surveys.

The wool cloth supply map derived from the *Tableau* (Figure 3) can be compared with a map of the number of woollen looms from an industrial survey made in 1794-95 (Figure 4).[25] Production regions delimited by a plain line are common to both of maps. Production regions delimited by a dotted line are present only in the loom map. This can be explained by the fact that the data based on the Maximum did not include exports. That minimized the importance of the Lille region, the Languedoc and the Western Pyrenees, which were exporting to the Austrian Netherlands, the Levant and Spain. Furthermore, the Maximum map indicates the distribution centres of the Languedoc cloth industry rather than their production centres, which was more

[24] Ibid., p. 64-67.

[25] Béaur and Minard, eds., *Atlas/Économie*, p. 76. The survey portrayed conditions in 1789-90.

inland (see the production region delimited by a dashed line). On the whole, the maps are similar and differences can be explained. This suggests that the data from the *tableaux* are indeed reliable.

The iron supply map drawn from the *Tableau* (Figure 5) can be compared to the map of furnaces and forges (Figure 6).[26] The two maps are similar and show the same production areas (identified with plain lines). The main differences come from the dotted areas. Contrary to what the *Maximum* suggests, neither Orléans nor Bordeaux were production centres. Yet, Bordeaux was a redistribution centre for iron from Périgord and Orléans might have been one for iron from Nivernais and Berry. That could explain why both these cities are listed as important "supplying" districts.[27] Again, the maps are similar and this suggests the data are reliable.

Supply maps for the other goods categories are available from the author. These other maps, even if they are not directly comparable with maps coming from industrial surveys, lend credence to the data in the *Tableaux*.

The bilateral trade data

An additional way to check the data from the *Tableaux* is to see if they fit a common econometric model of trade, the so-called "gravity model". Gravity models emerged in the 1960s as empirical tools to explain international trade. They get their inspiration from physics: the force of gravity depends positively on the product of the masses of the two objects and negatively on the distance between them. Gravity models explain trade flows as an increasing function of GDP or population and a decreasing function of distance (measured as transport costs) between trade partners. They have been very successful at explaining the pattern of trade data in a variety of

[26] The iron comparison uses Léon, "La Réponse de l'industrie", p. 228, which does not give a source but is based on an 1811 survey of conditions in 1789. Denis Woronoff graciously confirmed the origine of the map. for confirming its origin. See Bourgin and Bourgin *Industrie Sidérurgique*, and Woronoff, *Industrie Sidérurgique*.

[27] Béaur and Minard, eds., *Atlas/Économie*, p. 86.

settings.[28] If the bilateral trade data they fit a gravity model, then the evidence in the *Tableaux* would be even more credible.

One problem is that, in contrast with usual bilateral trade data, the data in the *Tableaux* do not indicate the value of trade flows, but only their existence. However, under the hypothesis that each national agent recorded the existence of a trade flow if it was superior to some threshold, one can use a logit regression in a usual gravity specification. Logit regressions explain the occurrence of a binary phenomenon based on the hypothesis that the explanatory variables affect the probabilities of the event according to a logistic function. There is no reason to believe that each national agent had the same threshold or even applied the same threshold for each good. But we can correct for such a possibility by introducing goods-specific consuming district fixed effects. Because production capacities and specializations differed between districts, supplying district fixed effects should be introduced as well.[29] These fixed effects will capture all the district characteristics that cannot be measured otherwise.

One consequence of introducing fixed effects in the gravity equation is that we cannot estimate the effect of district-specific variables directly because of collinearity issues. We can estimate them indirectly by regressing the fixed effects on district-specific variable. We are especially interested in measures of the "mass" of each district. Presumably, the number of districts supplied by a specific district depends on its production capacity while the number of district supplying the district depends on its demand level. We do not have information on district or departmental income differences, but the demand level and production capacity can be proxied by district-level population and urbanisation. The higher the population, the more demand for consumption and the more labour available for production. Towns had more diversified consumption needs: they should

[28] For a full discussion, see Anderson and van Wincoop, "Trade Costs" and Baldwin and Taglioni, "Gravity for Dummies". For some recent uses in economic history, see Mitchener and Weidenmier, "Trade and Empire", Estevadeordal, Frantz, and Taylor, "Rise and Fall".

[29] Having both supplying and consuming districts fixed effects produces a "theory-based gravity equation". See Anderson and van Wincoop, "Trade Costs" and Baldwin and Taglioni, "Gravity for Dummies".

increase demand. Towns were both production centres and coordinating centres for local production: they should increase production. [30] The following analysis includes dummy variables reflecting the existence of a town having between 10,000 and 25,000 inhabitants or more than 25,000 inhabitants in the consuming and in the supplying district.[31] Furthermore, a number of towns were gateways for international trade: Marseilles, Bordeaux, Nantes, Lorient, Rouen, Lille and Strasbourg. The following analysis includes a dummy to take that into account.[32]

We also need a way to measure the "distance" between each districts. Geographical distance is used as a proxy for trade costs in many gravity models, yet it is actually possible to go further and estimate transport costs in the case of 18th century France.[33] The law of the *Maximum* gives transport cost information that can be joined with evidence about roads and waterways to compute relative costs of transportation (Table 5).

To use these transport costs, we need to know what means of transport were possible between each district. Fortunately, the networks of roads and navigable waterways network are well known. I start from the hypothesis that transportation between two districts in France must be a chain of transportations between adjacent districts. It is then possible to compute transport costs in a three

[30] The causality between urbanisation and population on the one hand and the existence of trade links on the other hand could run both ways. This does not matter here, as the point of the exercise is not to establish any causality relationship, but to check if the data respect the usual empirical regularities embodied in the gravity equation.

[31] We have not used directly the population or the population squared of the largest town because we have no data on towns smaller than 10,000. Because the equation is log-linear, districts with no town larger than 10,000 (nearly 85% of them) would have to be excluded from the analysis to use these variables.

[32] District-level populations in 1791 are estimated using the 1793 census (Laboratoire de Démographie Historique / EHESS, *Census*) and estimates of departmental population in 1791 (Dupâquier, *Population française*, p. 82-83). Town sizes in 1794 come from Bernard Lepetit's work (Lepetit, *Villes dans la France moderne*, p. 450-53). This chronological discrepancy is not too much of a problem as the geographical structure of the French population did not change much from 1791 to 1794. District population was most of the time computed on the assumption that the evolution of population from 1791 to 1793 was the same for all districts in a department. For missing 1791 department population, the 1793 numbers were kept. For missing 1793 district and municipality populations, the estimates are based on surface.

[33] Unfortunately, the information given by the important enquiry of *an III* on transport costs is not useable. See Rémond, *Circulations marchandes*.

stage procedure. First, I used the maps of navigable waterways and post roads given in the *Atlas de la Révolution Française* to determine the available transportation link between "adjacent" districts (defined as those which administration centers were less than 60 kilometres apart, or which both include large ports).[34] Second, I computed the great-circle distance between administrative centres of these adjacent districts. Then, using the hypothesis that transport between two districts in France must be a chain of transports between adjacent districts, I applied a short-route finding algorithm using a network analysis program (UCINET) to compute transport costs between every 552 districts.[35] The result can be illustrated by relative transport costs to Marseilles and Paris (Figure 7 and Figure 8) using as distance unit the "trail-equivalent kilometre".[36] The resulting transport prices are a very rough approximation. Regional variations, due to differences in traffic volumes, different fodder prices, differences in the condition of waterways or roads, are not taken into account. Nor are seasonal variations.[37] But the transport costs were adjusted for the cost of reloading cargo, and using them is better than employing great-circle distance.[38]

Internal custom barriers should also be related to trade links. Numerous private tolls (still 1,600 in 1789) and municipal tariffs affected all trade relations, but since they did not change relative trade costs, the gravity equation does not have to take them into account.[39] As for internal

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[34] Arbellot, Lepetit, and Bertrand, eds., *Atlas/Routes*.

[35] Borgatti, Everett, and Freeman., *Ucinet*.

[36] Internal distance is computed using Head and Mayer, "Illusory Border Effects" fourth formula of approximately 0.67*square root(area/π) where the area comes from Laboratoire de Démographie Historique / EHESS, *Census*.

[37] Meuvret, *Commerce*, Szostak, *Role of transportation*.

[38] The gravity equation includes dummy variables to take the lower loading costs when two districts are on the same sea, year-round river, seasonal river or canal linked waterway. We have assumed breaks of load were minimized in four cases. First, when districts were both bordering the Channel, the Atlantic or the Mediterranean Sea (according to Le Bouëdec, "Coastal Shipping", p. 96, the Channel and the Atlantic were in two different coastal trade areas). Second when they were both on the same year-round navigable river: Seine, Loire or Rhine. Third when they were on the same river: Seine, Loire, Adour, Saône or Rhône, Somme, North rivers, Meuse, Moselle & Sarre, Vilaine, Charente, Dordogne or Garonne or their affluents. Fourth, when they were on rivers linded by canals: Seine and Loire; Saône or Rhône and Loire; Canal du Midi and Garonne.

[39] Conchon, *Péage en France*.

custom duties, French provinces were divided in three categories. The first, *Étranger effectif* (provinces actually foreign) included recently annexed provinces that were treated as foreign countries. Goods entering "interior" France from these provinces had to pay custom duties the same way as foreign goods. They often enjoyed smaller tariffs on their borders to Switzerland and Germany than on their border with "interior" France. The second category consisted of provinces united in what was essentially a large custom union, the *Cinq Grosses Fermes* (Five large tax farms) that covered a large northern half of France (Figure 9). The remaining area, the *Provinces reputées étrangères* (provinces deemed foreign: Artois, Bretagne, Flandre, Guyenne, Saintonge, Languedoc, Provence, Dauphiné and Lyonnais) included provinces note not integrated in the national custom union. They were subject to 21 local tariffs that goods paid at specific points.[40]

Although the complexity of the system was a cost in itself, the amount of collected custom taxes was not large. Tariffs collected inside *Provinces réputées étrangères* or between them and the *Cinq Grosses Fermes* (part of the so-called *traites*) represented only 0.25 percent of French GPP (against 0.7-0.8 percent for external tariffs). Consumer taxes, mostly on alcoholic beverages (so-called *aides*) and taxes on goods entering cities for their consumption (so-called *octroits*) were higher and amounted to respectively approximately 1.4 percent and 0.35 percent of French GPP.[41] Trade between *Cinq Grosses Fermes* districts was in all likelihood less expensive than trade elsewhere. To reflect that, we introduce a *Cinq Grosses Fermes* dummy variable in the gravity equation to differentiate trade links inside the *Cinq Grosses Fermes* from others.

Let us consider our gravity equation. It is estimated for each category of goods. The dependent variable is $Link_{i,j,k}$ which takes the values 1 if the district i supplies the district j with the good k and 0 otherwise. Coefficients are estimated via a logit procedure that assumes there is a latent continuous variable $y_{i,j,k}$ such that $Link_{i,j,k} = 1$ if $y_{i,j,k} > 0$ and $Link_{i,j,k} = 0$ if $y_{i,j,k} \leq 0$. The latent variable to be determined by the following equation, where ε is assumed to be independent from

[40] Mousnier, *Institutions de la France*, p. 412-20, Bosher, *Single Duty Project*.

[41] Mathias and O'Brien, "Taxation in Britain and France", p. 608, 622, 631-32.

the explanatory variables and to have a standard logistic distribution.[42] The coefficients of this equation are estimated through a maximum-likelihood method. The easiest way to interpret the coefficient is to convert them to odds ratios. An odds ratio higher than one means that the variable has a positive effect on the probability that a trading link exists. An odds ratio smaller than one means that the variable has a negative effect. Table 6 presents the results of these equations and report odds ratios of interest.

$$
\begin{aligned}
y_{i,j,k} = {} & \beta_{0,k} \\
& \left.\begin{aligned}
&+\beta_{1,k}.(\text{log of transport costs from } i \text{ to } j)+ \\
&\beta_{2,k}.(1 \text{ if } i \text{ and } j \text{ are part of the Cinq Grosses Fermes, 0 otherwise}) \\
&+\beta_{3\ldots6,k}.(1 \text{ if } i \text{ and } j \text{ are on the same sea, year-round river, seasonal river or canal-linked waterway, 0 otherwise})
\end{aligned}\right\} \text{Trade cost variables} \\
& +\text{Supplying districts fixed effects}_{i,k} + \text{Consuming districts fixed effects}_{j,k} + \varepsilon
\end{aligned}
$$

The odds ratios for the transport costs lend credence to the data. They are closer to zero for heavier goods and are high and significant for the *Cinq Grosses Fermes* dummy (Table 6).[43]

Consuming district characteristics do not explain much of the variance in trade links. When consuming district fixed effects are removed, the quasi-R^2 drops only 0.06 to 0.15, depending on the sort of goods involved (Table 6). By contrast, supplying districts variables explain a large part of the differences in trade links, a sign that consumption patterns are more homogeneous than production patterns (Table 6). That is expected, since there is more specialization in production than in consumption.

To check whether the district fixed effects are plausible, we regress their coefficients in the gravity equation on district-specific variables.[44] More specifically, we run the following regressions where $fe_{i,z}$ is the coefficient (not the associated odd ratio) of the fixed effect for district i and z indicated whether we look at the consuming fixed effect or the supplying fixed effect.

[42] Assuming that ε has a normal distribution would change the equation into a probit gravity equation with similar results.

[43] It might however be the case that this dummy also captures the better quality of the transport network in Northern France.

[44] I thank James Forman-Peck for pointing out to me that the method I used in preceding version of the paper to examine the effect of district-specific variable was wrong.

$fe_{i,supply} = \alpha_{0,supply} + \alpha_{1,supply}$.(log of the population in district i)
$+\alpha_{2,supply}$.(1 if i includes a town between 10,000 and 25,000 excl. importing towns, 0 otherwise)
$+\alpha_{3,supply}$.(1 if i includes a town larger than 25,000 excl. importing towns, 0 otherwise)
$+\alpha_{4,supply}$.(1 if i includes an importing town, 0 otherwise) + $\varepsilon_{i,supply}$
and
$fe_{i,cons} = \alpha_{0,cons} + \alpha_{1,cons}$.(log of the population in district i)
$+\alpha_{2,cons}$.(1 if i includes a town between 10,000 and 25,000, 0 otherwise)
$+\alpha_{3,cons}$.(1 if i includes a town larger than 25,000, 0 otherwise)+ $\varepsilon_{i,cons}$

Demographic variables, though of the right sign, are not very often significant (Table 8). Towns only statistically significantly affect consumption for half of the goods. Still, they do it in the right direction. The fact that the coefficients are of the right sign lend credence to the data.

The coefficient of the supplying district variables must be interpreted with some care. If a district A does not furnish other districts with a particular good, then the supply district fixed effect "explains" the lack of supply and rules out any role for other variables. It is thus impossible to run the regression with these observations. Hence they are all dropped from the regression.[45] As a result, the coefficient of the supply district variables only indicates whether, among districts actually furnishing a given good, some supply more districts than others.

It is actually possible to study the characteristics of districts that supply some goods compared to those that supply none, but another regression must be run. The explained variable is $Supply_{i,k}$ which takes the values 1 if the district i supplies at least one district with the good k and 0 otherwise. The logit procedure assumes that there is a latent continuous variable $z_{i,k}$ such that $Supply_{i,k} = 1$ if $z_{i,k} > 0$ and $Supply_{i,k} = 0$ if $z_{i,k} \leq 0$. This variable is determined by:

$z_{i,k} = \gamma_{0,k} + \gamma_{1k}$.(log of the population in district i)
$+\gamma_{2k}$.(1 if i includes a town between 10,000 and 25,000 excl. importing towns, 0 otherwise)
$+\gamma_{3k}$.(1 if i includes a town larger than 25,000 excl. importing towns, 0 otherwise)
$+\gamma_{4k}$.(1 if i includes an importing town)$+\varepsilon$

Where ε is assumed to be independent from the explanatory variables and to have a standard logistic distribution. The explanatory power of the regression is small (Table 10), as demographic

[45] The same happens when a district does not consume goods in specific goods category coming from any other districts, but it is much more uncommon.

variables are of limited use to help predict which kind of goods each district will produce: two districts with the same population and urban centres could be specialized respectively in hardware or cotton. Large population and the presence of an urban centre play an important role in determining whether a district will supply a specific good or not: this puts to the fore the distributive role of towns. This reinforces the credence of the data.

With this limitation in mind, it is clear that urban centres in the supplying district played a positive role in determining the number of supplied districts for many goods (Table 9). Larger towns and importing towns played a larger role. Urban centres did not play a statistically significant role, however, for hardware, drinks (mainly wine), paper, iron, wood and fuel. Except for hardware, all of these goods were agricultural products, and so were unlikely to be manufactured in cities. And even hardware often had to be made near sources of fuel that were outside cities. Similarly, the negative role played by population for iron and wood, can be explained by the competition between heating and industry for wood. The supply results therefore seem plausible, which supports the credibility of the data.

On the whole then the gravity equation leads to reasonable results. Distance was an important impediment to trade in all goods and distance was most important for low value-to-weight goods. The French internal custom union encouraged trade. Towns of all size had a positive role in production or distribution for most of the goods. Since the data seem credible, we can see what they say about market size.

Measuring the size of French markets

The easiest way to measure the size of the market for a specific good coming from a specific district would be simply to sum the population of all the districts that have declared they are consuming it, but that approach is not possible because the *tableaux du Maximum* do not exist for every consuming district. But, it is possible to use the model estimated in the preceding section to compute the probability that each district is consuming goods coming from each supplying district. Summing the population of each consuming district weighted by these probabilities yields an expected market size for each supplying district. For example, if Marseilles were predicted to have a 90 percent probability of supplying every French district in various consumption goods, its expected market size would be equal to 90 percent of the French population.

Whether one should use the consuming district fixed effect dummies for this exercise is debatable. If they simply reflect the whims of the local administrators, then they reveal nothing about their neighbouring districts. But, if they contain information on unobserved local characteristics, then extending their effects to the whole surrounding department or to the adjacent districts might be useful. Fortunately, the decision about what to do here is not crucial because the consumption fixed effects do not contribute much in explaining the pattern of trade links (Table 8). I have chosen to omit the consumption fixed effects when calculating market size, but the results are similar when they are included.

The estimates of market size are computed in a two-step process. The first step is to estimate a new gravity equation without the consuming district fixed-effects, but including all consuming district specific variables (log of population, town between 10,000 and 25,000, town larger than 25,000). Its results are very similar to the preceding ones and are not repeated. As expected, this model has less explanatory power. Transport costs have less of an effect, suggesting that consumer district dummies were indeed capturing part of the remoteness factor of some districts and not simply the whims of their national agents. The second step is to apply the results of this gravity equation "out of sample" to compute the probability that each and every French district is consuming goods coming from a specific supplying district using bilateral variables, supplying districts fixed effects and consuming district demographic variables. This yields, for example, the probability that each French district was being supplied by the districts of L'Aigle (French department of the Orne) in hardware goods and by Angoulême (Charente) in paper goods (Figure 10 and Figure 11).[46] Proximity is the determinant factor in determining supplying areas, but they are also affected by urbanization, population and the borders of the internal custom union. For each

[46] The pin factory so famously described by Adam Smith was in L'Aigle (Smith, *Wealth of Nations*, Peaucelle, "Pin making example"). I am grateful to Robert Allen for pointing this out to me.

good and each supplying district, we then add up the population of all the consuming districts weighted by the estimated probability that each consuming district is actually supplied by the supplying district in question. The standard errors in the estimates are used to compute 95 percent confidence interval around the expected market size (Table 11, Table 12 and Table 13).

For all but the lowest value-to-weight goods, the estimated French market sizes for the main suppliers were larger than the whole of Britain (9.9 million inhabitants in 1790).[47] Some of the supply centres with the largest markets did admittedly specialize in the redistribution of imports, especially in the case of cotton and miscellaneous consumption goods (including colonial goods). Rouen was an important redistribution centre for many textiles and hardware import from Britain, even though the district of Rouen was also an important production centre. In the case of cotton, the district of Hennebont in Brittany included Lorient, a redistribution centre for imported Asian goods. But the majority of the supply centres were inland producers. Troyes and Amiens were not import centres, and they had a market for cotton textiles as large or larger than Britain. In the case of hardware (another important sector for the Industrial Revolution), some French producing districts also had domestic markets as large or larger than Britain.

To be sure, population might not be the right comparison metric, since French customers had certainly a smaller purchasing power than British customers. Real GDP per capita was 70 percent higher in Britain than in France in 1791.[48] Nominal GDP per capita was 75 percent higher.[49] According to David Landes, one key difference between Britain and France in explaining different

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[47] Extrapolated from Maddison, *World Economy*, Crafts, *British Economic Growth*.

[48] The British real GDP per capita in 1790 was computed based on Maddison's estimate of the British GDP in 1801 and Craft's estimate of the real growth rate between 1780 and 1800 (Maddison, *World Economy*, Crafts, *British Economic Growth*). The French real GDP per capita in 1790 was computed based on Maddison's estimate of the French GDP in 1820 and Toutain's estimate of the real growth rate between the 1780s and the 1820 (Toutain, "Le produit intérieur brut").

[49] The UK nominal GDP per capita in 1790 comes from Veverka, "Governement Expenditure", quoted in Officer, "GDP for the United Kingdom". It is transformed into the British nominal GDP per capita using the ratio between the UK real GDP and the British real GDP in 1801 given by Maddison. The French nominal GDP comes from Toutain and the French population from Dupâquier, *Population française*. The comparison is made assuming that a Pound Sterling is equal to twenty-five Francs.

levels of technical innovation was the aggregate disposable income.[50] Setting the subsistence level according to Angus Maddison's estimates at 400 1990 $, disposable real income per capita was 110 percent higher in Britain than in France.[51] The comparison in nominal disposable income terms is more difficult, as we do not know what was the price of the subsistence basket in France and in Britain. If we assume that the income level of the poorest category of the population (cottagers, poor and vagrants in England and Wales, agricultural day labourers and servants in France) was equal to the price of the subsistence basket, then disposable nominal income per capita was 85 percent higher in Britain than in France.[52] Even if we use the criterion that is less favourable to France (real disposable income), there are still French markets for many goods that are larger than Britain as a whole. Such markets include hardware and cotton (Table 14).

Higher inequality in France could conceivably have restricted market size in France by biasing demand toward luxury products such as silk.[53] Yet recent computations suggest that inequality in France was not worse than in Britain. For 1788, Christian Morrison and Wayne Seynder have calculated that French income distribution had a Gini coefficient of 0.59, slightly higher than in England and Wales in 1759, but equal to England and Wales in 1801.[54] Philip Hoffman, David Jacks, Patricia Levin and Peter Lindert even find that France in the 1780s was less unequal than England and Wales in 1802 (as measured by the ratio of average nominal income in the top 20 percent to the bottom 40 percent of the income distribution), both in real terms and nominal terms.[55]

Perhaps France only comes out ahead when we look at high value-to-weight goods. After all, the French markets for iron and coal, That is not surprising since they were bulky goods, but it

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[50] Landes, *Unbounded Prometheus*, p. 47-48. I am grateful to Patrick O'Brien for pointing this reference to me.

[51] From Maddison, *Chinese Economic Performance* and Milanovic, Lindert, and Williamson, "Ancient Inequality".

[52] Morrisson and Snyder, "Income Inequality of France", Lindert and Williamson, "England's Social Tables".

[53] Murphy, Shleifer, and Vishny, "Income Distribution", Zweimüller, "Impact of Inequality".

[54] Morrisson and Snyder, "Income Inequality of France".

[55] Hoffman et al., "Real inequality", p. 342 and 345.

would be more interesting to compare the French markets for these goods with the actual markets for them in Britain. Lower British transport costs could conceivably have given British producers access to a larger market. Unfortunately, we do not have enough information on the sizer of the British market for these two goods. But the same objection does not apply to textiles and hardware, two key goods for the innovation of the Industrial Revolution.

Large market size for goods highly dependent on local natural resources might not mean much. Coal, for example, had a limited number of supply sources in France.[56] Even if all of France was being supplied by one or two of them, the transport costs would have been so high that very little extension of the market would have been possible even with dramatic production innovations. This objection is not valid in our case, since the production of most goods categories was possible throughout France. Certainly, the number of supplying districts for each goods category was large (see Table 10).

Another concern might be that our measure of market does not sum up all the pertinent information on the way markets can influence innovation. This concern can be based on numerous alternatives. First, actual market size might be an imperfect proxy of potential market size, especially if the cost of setting up new trade links is not too important. Second, indirect trade – through some regional nodal point – might be much less informative to the producer as to the tastes and preferences of consumers than direct trade. In that case, similar markets might have different effects on innovation depending on their organisation. Third, producers might not benefit from a large market if local preferences are very diverse as, in this case, some innovations might only be beneficial for part of the market. However, especially for the high value-to-weight goods, examination of the consuming lists from the Maximum do not show large regional differences in the bundle of goods supplied by individual districts. Fourth, for some innovation models, the actual scale of production in industrial districts would be more important than the potential market size: we should measure production level rather than market size. Fifth, some innovation models operate

[56] Béaur and Minard, eds., *Atlas/Économie*, p. 85.

at the level of firms rather than on the level of the industrial district and hence we should measure the size of the market supplied by each firm rather than by each district. The list could go on: the whole range of possible relations between innovation and market size cannot be explored by the Maximum. Still, it is at least an interesting first step in its exploration.

Another concern is fact that international markets might matter more than domestic ones markets. But in the late 18th century, Britain did not have more potential international customers the France. In the late 1780s, both countries had access to the full extent of European and world markets: French trade networks reached as many potential customers as British trade networks, even if they did so with less success. After the American Revolution and before Haiti gained its independence and Britain established full control in India, French overseas colonies and the British ones had total population that differed by less than on million people.[57] The situation was of course very different after 1793 when France was cut off from intercontinental trade because of British naval supremacy. But, in the 1780s, trade statistics show that French products were available in the same markets as English products. French exports (including re-exports) in 1787 were 15.5 million £ and British exports in 1784/86 were 13.5 million £. French exports in industrial goods were 7 million £ and British industrial exports were 11 million £.[58] This 4 million £ difference was less than 5 percent of French industrial production.[59]

Conclusion

The data gathered by the French government in 1794 are an exceptional gateway to the study of French domestic trade at the end of the 18th century. The information they provide is plausible and compatible with other sources. The *tableaux du Maximum* could be used to explore other aspects of the late eighteenth century French economy. They could complete available regional production data to shed light on French geographical inequalities. They could be compared with departmental level data collected during the Napoleonic area, or with prices (for example the

[57] Etemad, *Possession*, p. 308-11.

[58] Arnould, *De la balance du commerce*, Davis, *Industrial revolution*, Daudin, *Commerce et prospérité*.

[59] Toutain, "Le produit intérieur brut".

monthly evolution of the value of paper money in each department, as suggested by François Velde) to study the diffusion of monetary shocks. They could also be employed to investigate subsequent internal migration.

For our purposes, the *tableaux* demonstrate that numerous French producers had access to domestic markets that were larger than those in Britain. That was true in particular in hardware and textiles. Given the emphasis that economic growth models place on market size and the general consensus that France was handicapped by fragmented markets, that is a startling result.

We are not arguing that France should have industrialized before Britain. Rather, our claim is that size-innovation relationships do not explain the course of the Industrial Revolution. Market integration in a pre-industrial setting might still be useful to understand the relatively rapid French growth during the eighteenth century. Adam Smith could certainly not predict the emergence and future form of the Industrial Revolution by describing the division of labour in a French pin factory. But he still uncovered an important path to higher productivity.

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Tables

TABLE 1: GOODS CATEGORIES

Official categories	Thomas Le Roux's categories (see infra)
1- Fresh and salted meat and fish 2- Dried vegetables 3- Products from living animals	1- Food items
4- Drinks	2- Drinks
5- "*Épiceries et drogueries*", including consumption goods (vinegar, honey, candles…) and inputs to industries (tinctorial products…)	3- Miscellaneous consumption goods 4- Miscellaneous production goods
6- Wool and wool cloths	5- Wool and wool cloth
7- Hemp and ropes 8- Linen threads and ribbons 9 – Linen cloths	6- Linen and hemp
10- Cotton threads and cloths	7- Cotton
11- Hosiery	8- Hosiery
12- National and foreign silks	9- Silks
13- Leather and hides 14- Common and fine hats	10- Leather products, hides and hats
15- Paper	11- Paper
16- Iron	12- Iron
17- Hardware	13 – Hardware
18- Wood for industry (shook, white cooperage…)	14 – Wood for industry
19- Fire wood 20- Coal	15 – Fuel

Source: Le Roux, *Commerce intérieur*
Notes: Le Roux has consolidated some categories with few items, and has divided up the fifth category that included a very large number of goods. Silk was exempted after the legislation was passed.

TABLE 2: AVAILABLE *TABLEAUX DU MAXIMUM*

Full tableaux (listing all goods categories)	242	44%
Nearly full tableaux (missing one or two minor goods category – paper, fuel…)	133	24%
Partial tableaux	72	13%
Very partial tableaux (listing very few product categories)	40	7%
Missing tableaux (no information)	65	12%
Total	552	100%

Notes: Including Montélimart. Even though it was not annexed to France before 1798, some other districts give it as a supply source.
Source: Le Roux, *Commerce intérieur* and personal research.

TABLE 3: HEADERS OF THE *TABLEAUX DU MAXIMUM*

The list of goods "usually consumed" in their territory	Where each good came from	The four thirds of their production or importation price in 1790	Distance over which they had to be transported	Transport costs	Price including authorized wholesale profits (5% of the price including transport costs)	Price including authorized retail profits (10% of the price including transport costs).	Comments (often the price of a smaller amount of goods than the one used for the computation)

Source: Le Roux, *Commerce intérieur*

TABLE 4: DATABASE

Supplying districts	Consuming districts	Goods categories	Information	Number of observations
552 (only 527 actually supply)	88	15 (including silk)	1 if at least one mention of the supplying district in the consuming district's *tableaux*, 0 otherwise	728,640

Source: See text

TABLE 5: RELATIVE TRANSPORT COSTS FOR A ONE-QUINTAL LOAD

Type of transport	Cost relative to one kilometre of trails
Trail (1km)	1
Road (1km)	0.889
Up-river (1km)	0.444
Down-river (1km)	0.167
Canals (1km)	0.389
Coastal navigation (1km)	0.3
Sea: Between Marseilles and one of Bordeaux, Nantes and Rouen[a]	200
Sea: Between Rouen and one of Bordeaux and Nantes	150
Sea: Between Bordeaux and Nantes	100

[a] According to data in Carrière, *Négociants marseillais*, pp. 623-24 showing that the cost of transport by direct sea link between Marseilles and Rouen, including insurance, was 2/3[rd] of the cost of transport inland by rivers, canals and roads. Other sea links are conjectural. They are needed as it was much cheaper per kilometre to ship goods between grand ports than through coastal navigation.

Note: this table should be read in the following way: the price of transporting a load on one kilometre of canal is equal to 38.9 percent of the price of transporting it on one kilometre of trail. The price of transporting a load between Bordeaux and Nantes is 100 times more expensive than transporting it on 1 km of trail.

Sources: Law of the Maximum. Conjectures are in grey.

TABLE 6: EXPLAINING TRADE LINKS

	log of transport costs	cinq Grosses Fermes	number of non-trivial observations	quasi-R^2	decline in the quasi-R^2 if consuming district fixed effects are removed	decline in the quasi-R^2 if supplying district fixed effects are removed
Cotton	0.17***	1.8***	6,873	0.50	0.08	0.37
Hosiery	0.16***	3.1***	9,309	0.42	0.09	0.22
Hardware	0.16***	(1.2)	11,484	0.51	0.09	0.41
Misc. production goods	0.15***	(1.3)	13,288	0.58	0.13	0.45
Misc. consumption goods	0.13***	1.8***	23,496	0.51	0.09	0.36
Linen and hemp	0.09***	2.8***	21,824	0.50	0.11	0.30
Wool and wool cloth	0.09***	2.8***	24,112	0.57	0.08	0.43
Leather products, hides and hats	0.06***	2.7***	24,728	0.53	0.15	0.16
Iron	0.06***	8.5***	8,814	0.45	0.14	0.10
Food items	0.05***	2.1***	20,416	0.55	0.06	0.26
Drinks	0.04***	9.1***	19,448	0.53	0.14	0.21
Paper	0.02***	(1.5)	11,390	0.59	0.13	0.16
Wood for industry	0.02***	8.2***	14,706	0.67	0.12	0.10
Fuel (wood and coal)	0.03***	(1.1)	11,088	0.66	0.06	0.07

Notes: The numbers given are not the coefficients but the associated odds ratios. ***, ** and * denotes that the odds ratios are different from 1 at the 1 percent, 5 percent and 10 percent level. Odds ratios between parentheses are not statistically different from 1. Observations are classified as trivial and excluded from the analysis when a supplying district never supplies any other district in a specific goods category or when a consuming district is never supplied by any other district in a specific goods category. Observations about whether a district supplies itself are excluded.

Transhipment costs coefficients are very often insignificant. When they are significant, they are of the wrong sign: they are not reported. This suggests our measure of transport costs might overestimate the advantages of waterways.

The table should be read in the following way: multiplying the transport costs between two districts by 2.7 (or increasing their log by one) multiplies the odds ratio that a trading link exists by the value given in the second column of Table 6. In the case of cotton, if the probability was initially 25 percent (odds ratio of 1/3), it is changed to 5.4 percent (odds ratio of 0.057=0.17/3). Table 7 gives further guidelines for the interpretation of the transport cost odds ratio. The effect of both districts being in the *Cinq Grosses Fermes* is given by the third column: the odds ratio of the existence of a trading link is multiplied by the value given in the table. For example for cotton, the fact that districts A and B are both in the *Cinq Grosses Fermes* multiplies the odds that A sold cotton cloths to B by 1.8. If the probability that A sold cotton cloths to B was 25 percent (odds ratio of 0.33), it rises to 37 percent (odds ratio of 0.6).

Source: See text

TABLE 7: EFFECT OF AN INCREASE IN TRANSPORT COSTS ON THE PROBABILITY THAT A TRADE LINK EXISTS

Change in transport costs		Cotton	Linen and hemp	Paper
+1%	Change in the odds ratio	-1.7%	-2.4%	-3.8%
	New probability if initial probability = 90%	89.8%	89.8%	89.6%
	New probability if initial probability = 50%	49.6%	49.4%	49.0%
+10%	Change in the odds ratio	-15.5%	-20.5%	-31.1%
	New probability if initial probability = 90%	88.4%	87.7%	86.1%
	New probability if initial probability = 50%	45.8%	44.3%	40.8%
+100%	Change in the odds ratio	-70.7%	-81.2%	-93.4%
	New probability if initial probability = 90%	72.5%	62.9%	37.4%
	New probability if initial probability = 50%	22.6%	15.9%	6.2%

Notes: Table 7 should be read in the following way: increasing the transport costs between two districts by 10 percent reduces the odds ratio of a link existing by 15.5 percent in the case of cotton, 20.5 percent in the case of linen and hemp and 31.1 percent in the case of paper. If the initial probability for the existence of a link is 50 percent, it is reduced to 45.8 percent in the case of cotton, 44.3 percent in the case of linen and hemp and 40.8 percent in the case of paper.
Sources: See text

TABLE 8: EXPLAINING CONSUMMING DISTRICT FIXED EFFECTS

	Log of the population	Town between 10,000 and 25,000	Town larger than 25,000	Number of consuming districts	Adjusted-R^2
Cotton	(0.26)	(0.45)	(0.81)	87	0.04
Hosiery	0.46*	(0.29)	(0.30)	87	0.04
Hardware	(0.39)	(0.50)	(1.26)	87	0.08
Misc. production goods	0.68*	0.90*	1.85*	88	0.16
Misc. consumption goods	(0.44)	(0.43)	1.40*	88	0.09
Linen and hemp	(-0.42)	0.87**	1.78*	88	0.04
Wool and wool cloth	(0.42)	0.77**	1.52**	88	0.08
Leather products, hides and hats	0.74**	0.86*	2.35**	88	0.15
Iron	(0.29)	(0.81)	(2.19)	78	0.05
Food items	(-0.14)	(-0.04)	(1.06)	88	-0.01
Drinks	(0.27)	(-0.27)	(1.60)	88	0.00
Paper	(-0.07)	1.44**	3.21**	85	0.09
Wood for industry	(0.44)	(0.73)	3.06**	86	0.08
Fuel (wood and coal)	(0.33)	(-0.19)	(1.43)	84	0.01

Sources: See text

TABLE 9: EXPLAINING SUPPLYING DISTRICT FIXED EFFECTS

	log of the population	town between 10,000 and 25,000 (not importing)	town of more than 25,000 (not importing)	importing town	number of supplying districts	adjusted R^2
Cotton	(0.11)	(0.05)	1.82**	2.73***	79	0.18
Hosiery	(-0.53)	0.69*	2.59***	1.80*	107	0.21
Hardware	(0.45)	(0.05)	(0.56)	(1.47)	132	0.02
Misc. production goods	(0.60)	0.92**	1.99***	5.72***	151	0.34
Misc. consumption goods	(0.05)	0.83***	2.47***	5.55***	267	0.33
Linen and hemp	0.70***	(0.24)	(0.41)	1.54*	248	0.08
Wool and wool cloth	(0.19)	0.70*	2.60***	2.39***	274	0.10
Leather products, hides and hats	(-0.07)	0.35*	1.73***	1.54***	281	0.11
Iron	-0.98***	(-0.33)	(0.66)	(1.54)	113	0.08
Food items	(0.18)	(0.47)	(0.46)	2.53***	233	0.07
Drinks	(0.1)	(0.73)	(0.90)	(0.12)	221	0.01
Paper	(-0.04)	(0.12)	(-0.01)	(0.14)	134	-0.03
Wood for industry	-0.86**	(-0.80)	-1.80*	(-1.30)	171	0.09
Fuel (wood and coal)	(-0.32)	(-0.13)	(-0.45)	(0.07)	132	-0.01

Sources: See text

TABLE 10: EXPLAINING WHY A DISTRICT SUPPLIED AT LEAST ONE OTHER DISTRICT IN A SPECIFIC GOOD

	Log of the population	Town between 10,000 and 25,000 (not importing)	Town of more than 25,000 (not importing)	Importing town	Number of supplying districts (out of 552)	Quasi-R^2
Cotton	4.4***	(1.3)	4.0***	Full	79	0.12
Hosiery	2.0**	2.5**	7.8***	(2.0)	107	0.09
Hardware	(1.4)	(1.4)	3.2**	2.9*	132	0.03
Misc. production goods	1.8**	5.3***	7.2***	Full	151	0.12
Misc. consumption goods	1.6*	4.0***	6.1***	Full	267	0.07
Linen and hemp	1.9**	3.1***	(2.0)	4.2**	248	0.06
Wool and wool cloth	(1.3)	2.2**	3.3**	(2.2)	274	0.03
Leather products, hides and hats	1.4*	4.0***	3.1**	4.7**	281	0.06
Iron	(1.3)	(1.4)	3.0**	(2.4)	113	0.02
Food items	2.4***	2.2**	(1.9)	3.6*	233	0.06
Drinks	2.4***	(1.2)	2.4*	(1.5)	221	0.05
Paper	1.8**	1.8*	(1.6)	(1.4)	134	0.03
Wood for industry	1.5*	(1.2)	(1.2)	(2.0)	171	0.01
Fuel (wood and coal)	2.0**	1.7*	(0.6)	(1.2)	132	0.03

Sources: See text

TABLE 11: ESTIMATED POPULATION OF THE LARGEST MARKETS FOR HIGH VALUE-TO-WEIGHT GOODS

Misc. production goods		Hardware		Misc. consumption goods	
Marseille	27.9 [26.2—28.5]	Saint-Étienne	25.3 [22.8—26.9]	Marseille	27.8 [26.0—28.5]
Rouen	26.5 [24.5—27.6]	L'Aigle	22.3 [19.6—24.4]	Aix	22.1 [19.4—24.2]
Strasbourg	22.5 [19.9—24.6]	Paris	20.4 [17.5—22.9]	Montpellier	20.7 [17.9—23.1]
Paris	22.3 [19.6—24.4]	Thiers	19.7 [16.6—22.4]	Rouen	20.4 [17.6—22.7]
Montpellier	18.6 [15.7—21.2]	Rouen	17.8 [14.7—20.5]	Bordeaux	19.4 [16.6—21.8]

Notes: Populations estimates are in millions. 95 percent confidence intervals for the estimates are in bracket

Sources: See text

TABLE 12: ESTIMATED POPULATION OF THE LARGEST MARKETS FOR TEXTILES AND LEATHER

Cotton		Hosiery		Wool and wool cloth	
Rouen	26.0 [23.8—27.3]	Orléans	20.4 [17.1—23.0]	Amiens	28.0 [26.5—28.5]
Troyes	22.3 [19.3—24.5]	Troyes	14.0 [11.0—17.1]	Rouen	26.1 [24.1—27.3]
Hennebont	18.3 [15.1—21.1]	Rouen	12.8 [9.7—16.0]	Reims	25.6 [23.5—27.0]
Amiens	17.6 [14.5—20.4]	Angers	10.1 [7.1—13.5]	Sedan	25.5 [23.3—26.9]
Villefranche-Rhône	14.8 [11.5—18.0]	Amiens	9.6 [7.0—12.5]	Louviers	23.2 [20.9—25.1]
Linen and hemp		**Leather products, hides and hats**			
Bernay	21.7 [19.2—23.9]	Paris	17.1 [14.3—19.8]		
Lille	21.0 [18.4—23.3]	Lyon	10.7 [8.3—13.3]		
Rouen	14.3 [11.5—17.2]	Rouen	5.2 [3.4—7.7]		
Alençon	11.7 [9.2—14.7]	Niort	5.2 [3.2—7.9]		
Château-Gontier	11.6 [8.8—14.8]	Marseille	4.6 [2.9—6.9]		

Notes: Populations estimates are in millions. 95 percent confidence intervals for the estimates are in bracket
Sources: See text

TABLE 13: ESTIMATED POPULATION OF THE LARGEST MARKETS FOR LOW VALUE-TO-WEIGHT GOODS

Drinks		Paper		Food items	
Beaune	9.7 [7.3—12.4]	Angoulême	8.3 [5.8—11.2]	Dieppe	16.6 [13.7—19.4]
Mâcon	6.6 [4.5—9.2]	Tournon	4.2 [2.6—6.5]	Marseille	12.0 [9.3—15.0]
Épernay)	6.4 [4.4—8.9]	Rouen	3.6 [2.0—5.9]	Bergues	10.9 [8.3—13.9]
Orléans	6.1 [4.0—8.8]	Thiers	3.0 [1.7—5.4]	Boulogne	9.9 [7.3—12.8]
Auxerre	6.1 [4.1—8.7]	Montargis	2.7 [1.3—5.0]	Montivilliers	9.7 [6.9—12.8]
Fuel (wood and coal)		**Wood for industry**		**Iron**	
Saint-Étienne	1.2 [0.5—2.6]	Soissons	2.7 [1.5—4.7]	Saint-Dizier	2.9 [1.5—5.2]
Bayeux	1.1 [0.3—3.3]	Clermont	1.9 [0.9—3.7]	Joinville	2.5 [1.2—4.8]
Campagne de Lyon	1.0 [0.5—2.1]	Aleçon	1.4 [0.4—3.7]	Châtillon-sur-Seine	2.5 [1.2—4.9]
Orléans	0.9 [0.5—2.8]	Lamballe	1.3 [0.4—3.2]	La Charité	2.2 [0.9—4.7]
Saint-Denis	0.9 [0.6—2.2]	L'Aigle	1.3 [0.4—3.5]	Bordeaux	2.1 [1.0—4.3]

Notes: Populations estimates are in millions. 95 percent confidence intervals for the estimates are in bracket
Sources: See text

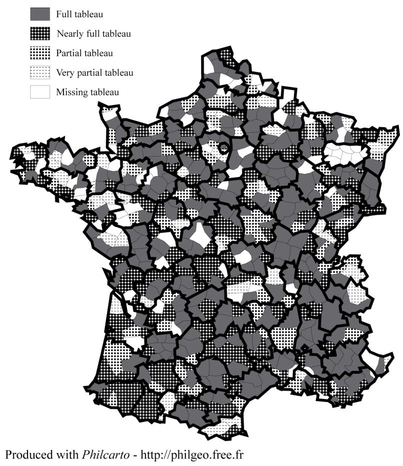
TABLE 14: NUMBER OF FRENCH MARKETS LARGER THAN BRITAIN AT THE 95 PERCENT CONFIDENCE LEVEL

Criterion	Population	Real income	Nominal income	Nominal disposable income	Real disposable income
Wool and wool cloth	14	8	7	7	6
Misc. production goods	12	4	4	4	2
Misc. consumption goods	12	5	5	2	1
Hardware	8	3	2	2	1
Cotton	5	2	2	2	1
Linen and hemp	3	2	2	2	0
Hosiery	2	1	0	0	0
Leather products...	1	0	0	0	0
Food items	1	0	0	0	0

Sources: See text

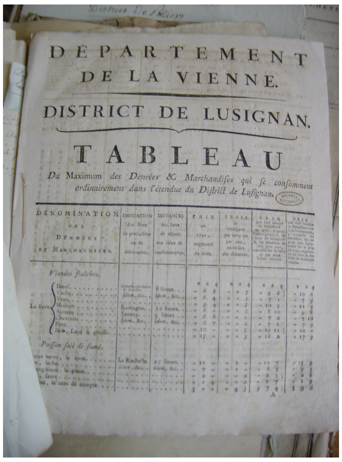
Figures

FIGURE 1: *TABLEAUX DU MAXIMUM* IN THE FRENCH NATIONAL ARCHIVES



Sources: Le Roux, *Commerce intérieur*

PICTURE 1: FIRST PAGE OF LUSIGNAN'S (VIENNE) LOCAL MAXIMUM TABLE (*TABLEAU DU MAXIMUM*)


DEPARTEMENT DE LA VIENNE.

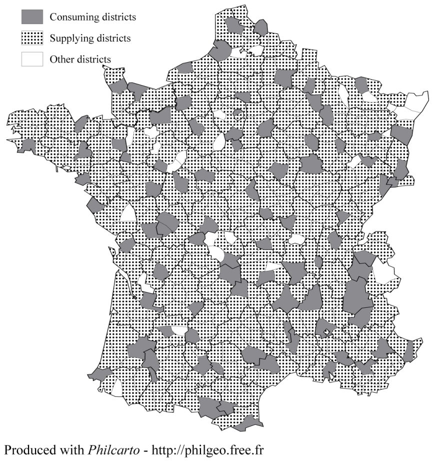
DISTRICT DE LUSIGNAN.

TABLEAU

Du Maximum des Denrées & Marchandises qui se consomment ordinairement dans l'étendue du District de Lusignan.

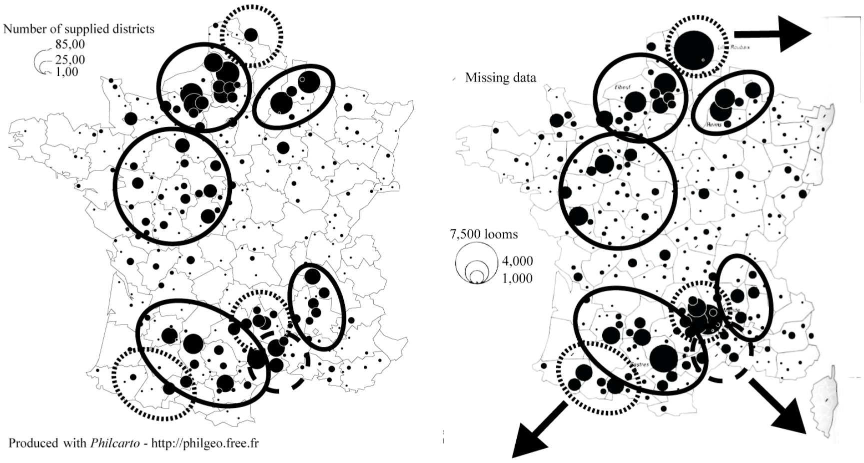
Sources: France, Archives nationales, Paris, F/12/1544/53.

FIGURE 2: SAMPLE



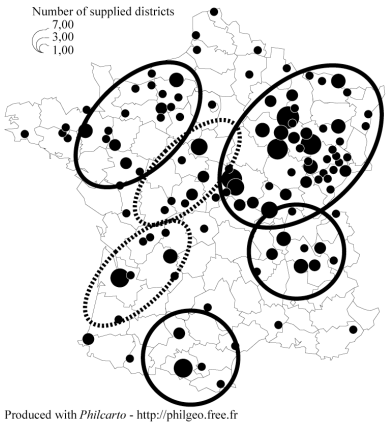
Sources: See text

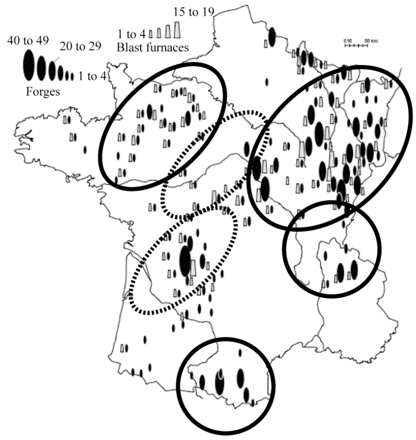
FIGURE 3: WOOL CLOTH SUPPLY MAP FROM THE MAXIMUM
FIGURE 4: NUMBER OF WOOLLEN LOOMS, EXCLUDING HOSIERY, IN 1789-1790



Sources: See text

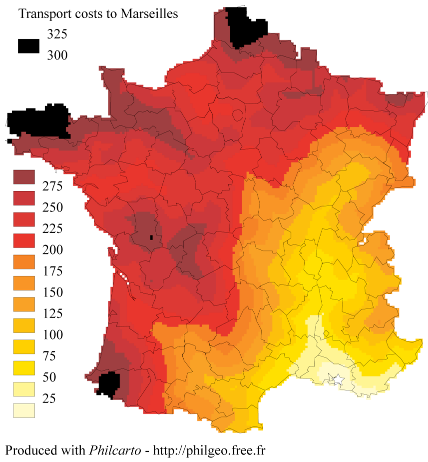
FIGURE 5: IRON SUPPLY MAP FROM THE MAXIMUM
FIGURE 6: FURNACES AND FORGES IN 1789

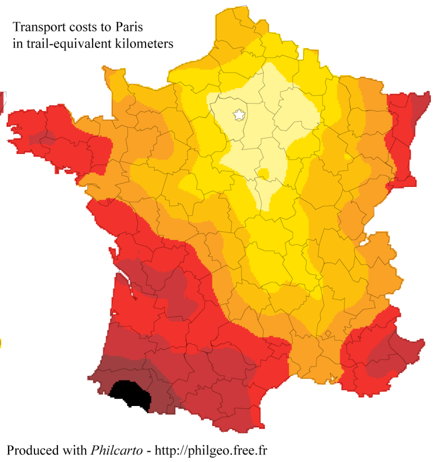




Sources: See text

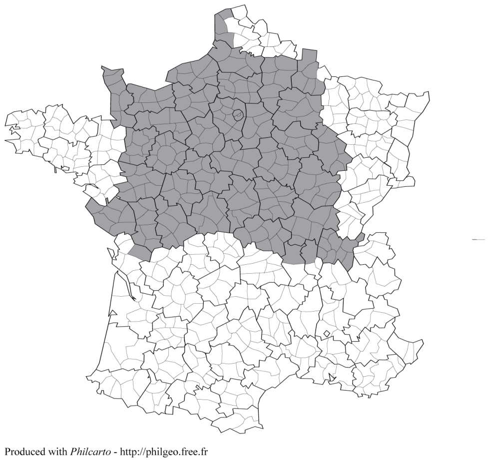
FIGURE 7: TRANSPORT COSTS TO MARSEILLES
FIGURE 8: TRANSPORT COSTS TO PARIS





Sources: See text

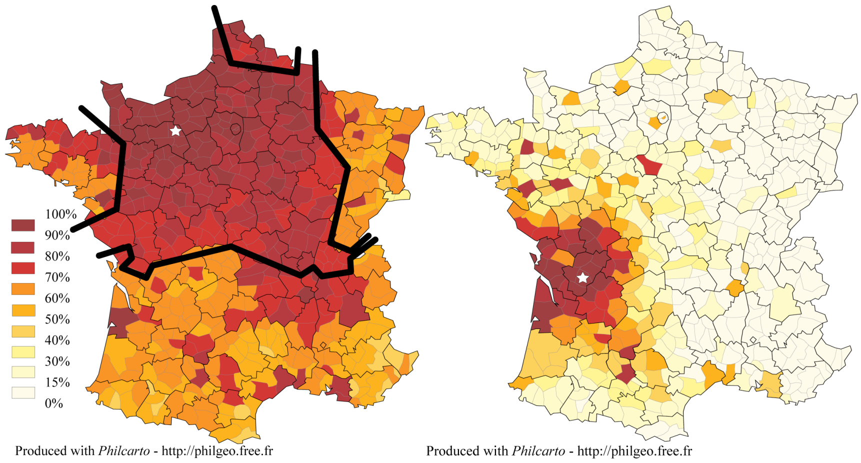
FIGURE 9: DISTRICTS THAT HAD PART OF THEIR TERRITORY IN THE *CINQ GROSSES FERMES*[60]



Sources: Corvisier, *Histoire moderne*, Bosher, *Single Duty Project*.

FIGURE 10: PROBABILITY OF A DISTRICT BEING SUPPLIED IN HARDWARE GOODS BY L'AIGLE (The thick line represents the borders of the internal custom union (Cinq Grosse Fermes)

FIGURE 11: PROBABILITY OF A DISTRICT BEING SUPPLIED IN PAPER GOODS BY ANGOULÊME



Sources: See text

60