

**IN THE EPICENTER OF THE STORM?
THE EFFECTS OF THE REVOLUTION AND
WARFARE ON THE FRENCH ECONOMY,
1789-1815**

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ABSTRACT

To assess the consequences of warfare and revolution on the French economy from 1792 to 1815, this chapter compares the dynamics of the French economy in the decades preceding 1789 and those following 1815. It discusses institutional changes, sectorial transformations, and macroeconomic trends of the French economy. The institutional reforms implemented by the various governments during the period between 1789 and 1815 were wide ranging. However, their direct impact on the economy is difficult to measure. What seems clear is that, on the whole, they reinforced the authority of the central state and favoured the development of rural France. The period had a profound influence on the industrial structure of the French economy. External trade was shattered by more than two decades of war and blockades and trade and export-led industrial sectors were badly hit. After 1815, the dynamism of the French economy was transferred from coastal ports and regions to the interior. These changes shaped the French economy of the nineteenth century which was dominated by agriculture and specialised in industrial sectors and techniques that used sparingly coal energy, and thus took an original path of development.

KEYWORDS

French Revolution; Napoleonic France; French Economic history; Economic consequences of warfare; eighteenth-century France.

JEL

N13, N33, N43, N54, N63, N73.

IN THE EPICENTER OF THE STORM? THE EFFECTS OF THE REVOLUTION AND WARFARE ON THE FRENCH ECONOMY, 1789-1815¹

Loïc Charles², Guillaume Daudin³, Silvia Marzagalli⁴

Abstract

To assess the consequences of warfare and revolution on the French economy from 1792 to 1815, this chapter compares the dynamics of the French economy in the decades preceding 1789 and those following 1815. It discusses institutional changes, sectorial transformations, and macroeconomic trends of the French economy. The institutional reforms implemented by the various governments during the period between 1789 and 1815 were wide ranging. However, their direct impact on the economy is difficult to measure. What seems clear is that, on the whole, they reinforced the authority of the central state and favoured the development of rural France. The period had a profound influence on the industrial structure of the French economy. External trade was shattered by more than two decades of war and blockades and trade and export-led industrial sectors were badly hit. After 1815, the dynamism of the French economy was transferred from coastal ports and regions to the interior. These changes shaped the French economy of the nineteenth century which was dominated by agriculture and specialised in industrial sectors and techniques that used sparingly coal energy, and thus took an original path of development.

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For more than two decades, France was the main protagonist of almost continuous warfare, beginning with the declaration of war voted by the National Assembly against the king of Bohemia and Hungary in April 1792. The Revolutionary and Napoleonic wars (1792/93-1815), were the consequence of a process set in motion by the Estates General's decision in June 1789 to transform France into a constitutional monarchy. The difficulties of creating new stable political foundations were exacerbated by the King's attempt to flee from France in June 1791, after which many of the competing parties hoped a war would help to advance their cause – be it the restoration of the Old Regime, or the stabilization of the Revolution. By 1792, France was fighting against a large coalition, reinforced by Great-Britain and the Netherlands in 1793. This conflict shaped the course of the revolutionary process. The subsequent successes of the French Revolutionary armies changed its nature from a defensive to an offensive conflict. By seizing power through a *coup d'État* in 1799, Bonaparte sought to use military conquest both as a source of legitimacy and as the means to externalise France's financial burdens. War subsequently became one of the pillars of the Napoleonic regime up to 1815.

It is very difficult to disentangle the consequences of the wars on the French economy from those linked to political decisions in Revolutionary and Napoleonic France. Would for instance the 1789 nationalisation of Church real estate have produced the same results for the structure of ownership if the French revolutionaries had not been compelled to indiscriminately increase the issues of paper money (*assignats*), which were originally secured on nationalised ecclesiastical property, to wage the conflict? And would the slave revolt in Saint-Domingue, which started in August 1791, have resulted in the 1794 abolition of slavery and in Haitian independence in 1804, if France had not been at war, and therefore unable to dispatch military forces across the Atlantic?

An additional difficulty in assessing the evolution of the French economy during this period stems from the fact that the historiographical debate on these issues has long been deeply affected by scholars' ideological positions on the Revolution.⁵ Historians have focused on the Revolution as such, rather than on warfare, as the key force driving the economic changes that occurred in France. French historians have acrimoniously debated the consequences of the Revolution upon the economy. Whereas Marxist historiography presented it as a fundamental momentum in the transition toward a capitalist economy – best illustrated by the end of the seigneurial system, the privatisation of land, and the dissolutions of guilds – others stressed its disruptive effects on France's economic growth, and more particularly on its trade and urbanisation.

Because the major political changes that occurred in France during the Revolutionary and Napoleonic wars cannot be separated from warfare, nor disentangled from intrinsic ideological biases, we decided to proceed by comparing the French economy before and after the Revolution. We propose to discuss the evolution of the French economy during the period that opened with the fall of the Bastille and closed with the final collapse of the French Empire in 1815, by prioritising a long-term view. We believe it is only by adopting this perspective that historians might provide a convincing analysis of the economic consequences of the 1789-1815 conjuncture.⁶ This study therefore compares the situation and dynamics of the French economy in the decades preceding the Revolution and those following the Restoration.

⁵ For a general bibliography and a comprehensive assessment of this debate, see the special issue of leading French economic journal *Revue économique* on this subject (1989).

⁶ This methodological stance should not be taken as a sign that we believe that political and military events did not affect the French economy.

The first section discusses the institutional transformations that took place between 1789 and 1815. They reinforced the authority of the central state, the rural world and small cities. The second section adopts a disaggregated approach in order to establish that the French economy was structurally different after 1815. Finally, the last section presents the macroeconomic trends for the French economy from c.1715 to c.1848. Institutional and geographical changes during this period contributed to the opposition between 'Paris and the French desert' (Gravier 1947; Fox 1971) . Along with major social upheavals, these changes shaped the rural, small-city France of the nineteenth century, that took an original path into the twentieth century (O'Brien & Keyder, 2012). This was detrimental to Atlantic France, big cities (especially ports) and, almost certainly, to France's overall macroeconomic dynamism.

1. Institutions

This section of the paper looks at the long run institutional changes introduced during the Revolutionary and Napoleonic eras that impacted the evolution of the French economy. The Revolution initiated a profound reorganisation of French society and its foundations. It did away with privilege as the fundamental principle of political, social and economic structure. It abolished or marginalised feudal and ecclesiastical institutions and local rights, and simplified property rights through the generalisation of *propriété libre* (freehold). As a result, the general institutional framework changed, and a strong centralised state came into being. Historians argue that these reforms contributed to the modernisation of the French economy in the nineteenth century, and their diffusion into polities under French military occupation was a decisive factor in their modernisation (Dincecco 2011; Yun-Casalilla & O'Brien 2012; Dincecco & Katz 2014; on the role of Napoleonic rule in the modernisation of Continental Europe polities, see Acemoglu *et al.* 2011).

1.1. Disappointing reforms?

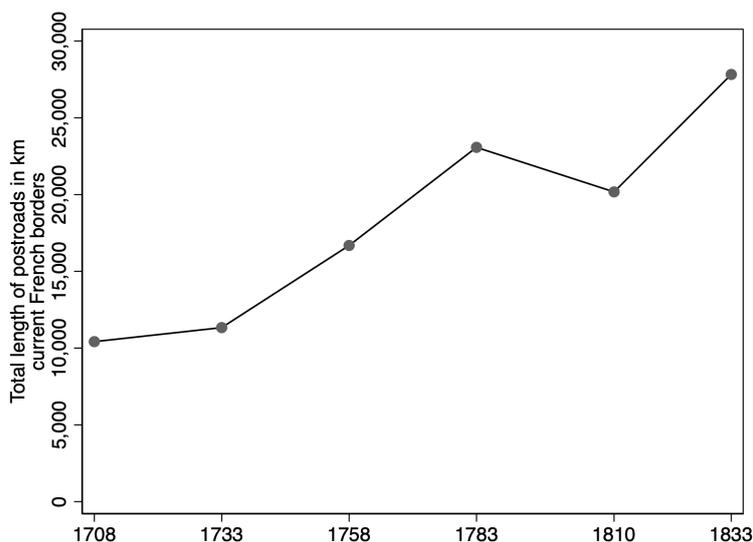
The First Republic introduced a series of institutional reforms that were later confirmed by the Napoleonic administration. They deeply modified the social and cultural environments in which the economy was embedded. Their aggregate effects, however, are difficult to measure.

The abolition of all internal barriers and tariffs and the liberalisation of the labour market were among the first political decisions made by the French National Assembly. Although the state allowed the reintroduction of certain tolls like the Parisian *octroi* to sustain municipal budgets and to pay for the maintenance of roads, the new system was much less burdensome than the old (Conchon 2002). The unification of weights and measures, the introduction of a decimal system, and the 1807 Code du Commerce promoted the circulation of goods and complemented Colbert's ordinance of 1673, which had already unified commercial law.

The low speed and high-cost overland transportation system of France had long been recognised as a major impediment to internal trade and economic efficiency (Daudin 2010). The eighteenth-century state had already improved the road network from 1738 (Arbellot 1973; Blond 2014). According to a nineteenth-century survey, the mean speed (including stops) of the *Messageries* was 2.2 kph in the seventeenth century, 3.4 kph in the late eighteenth century, and 4.3 kph in 1814 (Foville 1880). Whereas it took two weeks to travel between Paris and Bordeaux in 1740, that time had already dropped to 6 days in 1780 and to 4-5 days by 1795. Warfare stimulated at least one major technological invention that speeded up the transmission of information, Chappe's telegraph, but it was restricted to a military use and not available to private businesses before the 1830s. Faster communication went along with a consistent decrease in transport prices and nominal road transport costs declined by 51 per cent between 1800 and 1820 (Chabert 1945).

Nevertheless, the overall transport network only improved slightly. In the 1780s, there were approximately 25.000 km of ‘royal roads’. During the Revolutionary and early Imperial period, the transport infrastructure was not a priority and deteriorated. Despite a significant effort to build new roads and canals to mitigate the effects of the British blockade, by 1814, the total length of ‘national roads’ was only 27.000 km and that of canals only 1.271 km (Chabert 1949, 304-306; Abellot, Lepetit & Bertrand 1987, 14). The evolution of the network of post roads confirms both the regression of the Revolutionary years and the recovery that followed. Nevertheless, this recovery was not enough to catch up on Old Regime trends.

Figure 1: Evolution of post roads, 1708-1833



Source: Verdier & Bretagnolle (2007)

The impact of transport improvements on internal trade during the period remains debatable because data on most goods traded internally does not exist (Daudin 2010). It is however possible to compare the situation in the grain market before 1789 and after 1815.⁷ Measuring grain market

⁷ The Old Regime French economy was increasingly, but incompletely integrated – the price of wheat on local markets could vary by 300 per cent (Weir 1991, 926). In 1781-1787, an hectolitre of wheat cost 7.93 livres tournois in Douai (Nord) and 23.37 livres tournois in Aix (Bouches-du-Rhône).

integration based on the evolution of wheat price dispersion in France suggests that, after some progress between 1750-1788, the 1793-1815 period was one of strong market integration. However, this period is best represented as an exceptional phase of disintegration in 1793-1794, followed by a period of integration in 1812-1813. Outside of these dates, market integration did not make any significant progress. Over the long run, the trends before 1789 and after 1815 are similar (Chevet & Saint-Amour 1992, 153; Saint-Amour & Chevet 1991, 93-119). Ancien Regime trend towards greater market integration from 1700 to 1900 was thus interrupted by the Revolution and warfare. While some market integration occurred during the French Empire, it was not statistically significant (Federico 2012, 470-497).

New inheritance laws introduced by the Convention granted equal rights to all children. They aimed to foster equality as the basis for democratic regime. This was another important reform to a traditional system of property rights.⁸ Tocqueville considered that this political decision demultiplied the number of small properties – and thereby contributed to French agriculture's low propensity to innovate (Lemarchand 2008, 234-235).⁹ However, by 1846, the number of units of land ownership had in fact increased by a mere 5.9 percent, and this increase chiefly affected the largest parcels (Steiner 2008, 84)¹⁰: it is not clear that this reform did much to foster equality.

The educational system was largely taken over by the state after 1789. After a short-lived attempt to offer free education for all children in 1793, the Revolutionaries opted for a more limited policy by focusing on the formation of a new elite. This led for example to the creation of the *lycées*

⁸ Napoleon's 1804 *Code civil* allowed to favour only very moderately one child over the others.

⁹ Negative judgments on smaller holdings can be traced back to physiocratic ideas. Guy Lemarchand offers a more nuanced picture and stresses how the persistence of small property mitigated the social tragedies of rapid industrialisation.

¹⁰ Industrial capital found an effective means of avoiding too much division through inheritance, mainly through inbred marriage (Hirsch, 1991, 291-312).

(secondary education institutions for boys aged 10 and over), where over a third of places were reserved for the sons of civil servants and military officers. A nationwide selective examination was introduced for the recruitment of teachers, and still exists today. The foundation of the '*Grandes Écoles*' had begun in the mid-eighteenth century, with the *École des ponts et chaussées* in 1747 followed by the *École des mines* in 1783. In 1794 the Revolutionaries established the *École polytechnique*, the *Conservatoire national des arts et métiers* and the *École Normale*; and the Restoration introduced the *Ecole Normale supérieure de commerce* (1819), among others. The effect on the general population was minimal. Literacy continued to improve during the period, but the trend witnessed no radical change. Men and North-eastern France continued to be considerably more literate than the rest of France.

1.2. A winner: the central state

The example of education suggests the outcomes of the institutional reforms of the Revolution on the population at large should not be overestimated. However, these reforms did change the composition of the elites. Social background remained a fundamental element in determining access to education, but birth alone no longer guaranteed access to positions, and individual merits and competences furthered upward mobility. In general, the main beneficiary of these institutional reforms was the central state.

On the eve of the French Revolution, half of state income was transferred as interest on the public debt. This large debt was the result of the persistent structural imbalance between state revenues and expenditures (Guery 1978, 216-239; Morineau 1980, 269-336). This deficit and debt were exacerbated by the absence of institutions to fund the state's extraordinary needs in times of war when the French King was obliged to borrow on disadvantageous terms. Reiterated attempts to reform the fiscal system proved fatal to the absolute monarchy, leading to the convocation of the

Estates General in 1789 and the awakening hopes of a profound reform to relations between the monarchy and the country's economic elites (Bosher 1964; Bonney 2004, 191-215; White 1995, 227-255). Fiscal reforms – including the rationalisation of the administration in charge of the treasury and tax collection – were promoted by the Revolutionary ideology to service a sovereign debt that had led to the collapse of the Old Regime. In parallel, the creation of the Banque de France in 1800 provided a perennial solution to the issue of credit.

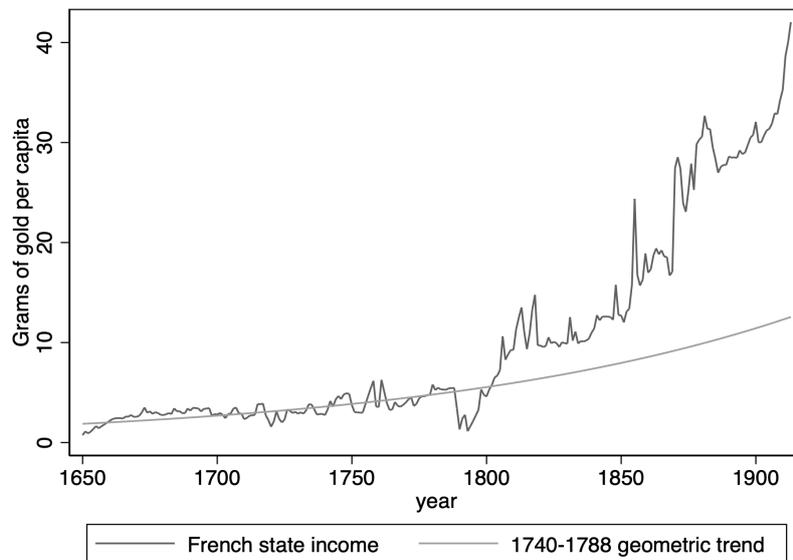
During the Revolutionary and Napoleonic period, the nationalisation and sale of Church property reduced sovereign debt, while the cost of warfare was carried in large part by conquered economies and taxpayers. From 1805 to 1814, Napoleon's expenditure amounted to 8,347 million francs, including 5,610 on the armed forces. Taxation covered all civil expenditures, and 49% of war expenditures. The remainder was mainly financed through the extraction of resources from plunder, requisitioning, indemnities and war subsidies (Branda 2007, 358).

By 1815, the total French debt amounted to 695 million Francs, compared to more than 3 billion in 1789 (Branda 2007, 496). Although Revolutionary France recognised the debt accrued during the Old Regime, the sale of ecclesiastical estates, the inflation of the *assignats*, and the 1797 repudiation of two-thirds of the nominal value of the French debt more or less abolished it. This virtual repudiation is all the more impressive given that France was almost continuously at war for 22 years. State expenditure rose from 550 million in 1801 to 975 million in 1813, when war costs absorbed between 74% of the total (Branda 2007, 358). By that time, half of the costs of warfare were funded by forced contributions from allies and defeated enemies. French victories extended the frontiers and the number of tax-payers. Napoleon did not borrow to pay for the cost of war, but he increasingly resorted to war indemnities – a strategy that lasted until 1811. Indemnities effectively paid for by Austria, Prussia, the Italian peninsula and Portugal during the Napoleonic

wars amounted to at least 400 million livres (Gabillard 1953, 359-60) and trade statistics reveal total imports of 631 million francs' worth of precious metal between 1797 and 1814 (Toflit). A large but unquantifiable portion of war-related costs, however, was not recorded in the French budget, as requisitions were directly spent abroad by the army.

Warfare was also financed by tax increases that were facilitated by the suppression of feudal and ecclesiastical dues and by the rationalisation of the fiscal administration during the turmoil of the Revolution. The move from a system of tax farming to a system of direct collection ensured that a larger share of collected taxes made their way into the state's coffers (White 2004, 636-663; Johnson 2006, 963-991). The abolition of venality in legal and fiscal administration and the introduction of recruitment on the basis of merit for state employees had net positive effects on income (Doyle 1996). Figure 3.2 contrasts the actual growth of per capita state income after 1788 with its projected evolution based on the 1740-1788 geometric trend. Central state income increased strongly after 1815 (Dincecco 1991, 303-316). Because of the disorganisation of the 1790s, France went through some years of very low taxation. As a result, the extra taxation from 1792 to 1815 was only 20% higher than the 1740-1788 geometric trend, while from 1804 to 1815 it rose to 65% above the geometric trend.

Figure 2: French state income, 1650-1913



Source: Dincecco 1991, authors' computations

The evolution of the number of central state personnel is another sign of the improvement of the central state's capacity that never reverted to its low Old Regime level (Figure 3.3).

Figure 3: The Growth of Ministerial Personnel, 1770-1850



Source: Church 1981, 73

Some of these trends were already visible before 1789, but the political and military situation that developed between 1792 and 1815 had a deep and lasting impact. The first peak of 1793-1795 corresponds to the intense mobilisation of the French state's resources to fight the counter-revolution on both internal and the external fronts. This episode was followed by a period of consolidation during the Directory, when the disparate range of new functions was progressively standardised and rationalised across the central administration. This move was furthered after the advent of Napoleon. If a viable system of formal career paths was not enforced at that time, some steps were taken in this direction. They initiated a tendency towards the rationalisation of the state bureaucracy that culminated with the reforms of 1844-1846. After 1818 (1819-1850), the number of public servants witnessed a slight growth, comparable to the pre-1793 period. There were, however, five times more civil servants in French ministries in 1820 compared to 1790. This period

also saw a deep change in the nature of the civil service. Before 1792, it was a collection of individuals who were dependent on office holders for their posts. In later years, it evolved into a bureaucracy in the Weberian sense as a set of positions organised into a formal hierarchy and a salariat with foreseeable career prospects based, at least in principle if not in fact, on seniority and merit.

1.3. The rise of rural France

The central state was the main winner from the institutional reforms of the period. Its rise created a change in the equilibrium between other social forces. Rural and small-city France benefited greatly from these changes. Under the Old Regime, French peasants tended to own or lease plots of farmland to cover their family's needs. Between 1726-1750 and 1781-1787, rents had increased faster than agricultural wages but slower than wheat prices (Weir 1991, 934-935). Landowners and, perhaps even more so, owners of seigneurial privileges were thus the main beneficiaries of agricultural growth.¹¹ Most rents were transferred to a small elite. The Church owned 6.5 per cent of French soil, the nobility slightly less than a third, and members of urban bourgeoisie approximately a quarter – with enormous differences across provinces –, while the remainder (1/3) was owned by peasants (Sée 1925). As state taxation fell on peasants rather than on landowners, the state did not benefit from the enrichment of the latter. Peasants were caught between the royal state, eager to increase taxation to meet its growing financial needs, and the rising rents imposed by landlords.

The nationalisation of Church estates was driven by fiscal urgency, due to the financial collapse of the monarchy. The nationalisation of ecclesiastical real estate in 1789 – followed by that of the

¹¹ For a thorough discussion of the differences between rents linked to landowning and owning of seigneurial privileges and their evolution in the eighteenth-century, see Patrick K. O'Brien and David Heath (1994, p. 23-62).

property of the *émigrés* in 1792 – galvanised the market, and approximately 10% of the French farmland changed ownership. This shattered the social structure of the Old Regime beyond repair. The Church lost almost all its real estate and the share of land held by the nobility declined dramatically. At a micro level, the effects of the sale of nationalised estates are more difficult to assess. They were extremely diverse, and depended on the number and size of estates and on the varying ways (in time and space) in which they were sold. In some instances, transfers of land benefitted the urban bourgeois who received rents – a change that did not encourage innovation. At the same time, these changes benefitted manufacturers who needed space and real estate for their workshops, as well as peasants and farmers who worked the land they had bought (Béaur, Minard & Laclau 1997, 48-49; Bodinier & Teyssier 2000). These effects were compounded by the hyperinflation episode of the *assignats* (1791-1795), which redistributed wealth from creditors to debtors. For the agricultural sector, historians consider that inflation had a redistributive impact comparable in magnitude to that of the nationalisation of ecclesiastical estates (Béaur *et al.* 1997, 58).

The transformation of the taxation system was also favourable to the peasantry.¹² The reform of the tax system was understandably one of the first priorities of the French National Assembly. A set of small, but key universal taxes were introduced. The new fiscal system made landowners liable for direct taxes. The new land tax was designed to be assessed on the basis of cadastral surveys, which were not completed until the 1840s. Other direct taxes were based on visible signs of wealth and on productive or commercial activities. This new system (which lasted with minor changes until World War I) significantly altered the distribution of wealth. Schnerb has computed that the land

¹² For a very good synthesis of the situation in the fiscal situation in the 1780s and its evolution during the Revolution and the Empire, see Eugene White (1995, 227-255).

tax amounted on average to 15% of gross agricultural output in 1791, but to less than 10% in 1821. Moreover, rates were equalised between the different parts of France.¹³

The abolition of seigneurial dues contributed to a geographical equalisation of land tax. During the Old Regime, these rights differed greatly between French provinces. For example, they deprived peasants of approximately 15 per cent of their revenues in the Toulouse region, but were consistently heavier in Bourgogne or Brittany: in these regions, before peasants paid taxes to the state and set aside seeds for the next sowing – which might require 20 to 25 per cent of the wheat harvest – they delivered up to a quarter of their crops to the Church and local *seigneur* (Gallet 1999). The suppression of both seigneurial dues and tithes not only contributed to improving fiscal uniformity across France, but also alleviated burdens on peasants. In addition, in the interval between the abolition of non-state taxes collected by the Church and nobility and the reorganisation of taxation by the state, Frenchmen enjoyed a few years of very low taxation in the early 1790s (see Figure 3.2). In the long run, the purchasing power of the French peasantry as a whole increased. Furthermore, more stable and clearly defined property right also provided stronger incentives to improve the land. Although the effects of this radical change in taxation were delayed by war-related fiscal burdens, it certainly contributed to the dynamism of French agriculture after 1815 (Rosenthal 1992).

The creation of *départements* in 1790 also had a significant qualitative impact on the organisation of the French economic space. *Départements* were smaller administrative units than Old Regime provinces. The reforms created new '*chefs-lieux*', or small administrative towns in the interior, in contrast to the large cities that played a central role in the Old Regime economy. *Chefs-lieux*

¹³ In 1791, the least taxed *département* had a seven times lower rate than the heavily taxed, but the ratio dropped to one to three by 1821, see Robert Schnerb (1972, 97).

provided a favourable institutional framework for the construction of new roads (and later railways), efficient public services, and a more geographically uniform allocation of state expenditures. Their populations grew at a faster pace than those of the largest cities, which also benefitted their agricultural hinterlands (Margadant 1992; Lepetit 1988, 238-322). In contrast with the Old Regime, the consumption levels in rural areas and small cities grew significantly after 1815.

2. Structural change

The shift in economic dynamism suggested by the study of institutional reforms is confirmed when looking at the long-term evolution of the agricultural, industrial and trade sectors. This section examines how the trajectory of the French post-war economy became qualitatively different from that of the Old Regime.

2.1. Agriculture

Recent evaluations of the general trend in agricultural production are fairly convergent (Postel-Vinay 1989, 1015-1046; Toutain 1992-1993; Toutain 1997; Daudin 2005, 31). The per capita output increased moderately throughout the eighteenth century, which among other things resulted in the disappearance of nationwide famines after 1709. Given that the population grew at a rate of 0.3% per annum, a plausible conjecture would be a 0.4% increase in the total production. Toutain's figures have been heavily criticised by many historians whose data are focused on wheat production, which grew slowly (Le Roy Ladurie 1968, 1086-1102; Morineau 1971). Although there was no major technical or institutional breakthrough in French agriculture before the Revolution, this does not imply that the sector was stuck in a low productivity trap. In fact, the proportion of wheat to other food crops decreased over the eighteenth century. Substitutes such as rice, vegetables, and particularly maize and potatoes gained ground in France over wheat, both in

production and in consumption (especially among the lower classes). In addition, marketable outputs including wine, animal products, and raw materials for industry, acquired more importance. The consumption of additional non-starch substitutes for traditional foods and drinks, such as sugar, coffee, cocoa and tobacco, grew very fast (Béaur 2000).

After 1815, French agriculture grew at an accelerated pace of around 1% per annum throughout the 1815-1850 period. To some extent, this faster growth reflected population trends (see section 3 below), but it was also due to the relative increase in agricultural prices that took place after the war period (Verley 1997, 349-353). Although the trend had begun in the second half of the eighteenth century, agricultural prices rose steadily in the 1815-1850 period. The shares of substitutes for wheat (such as potatoes, maize and vegetables) continued to rise, and cash crops such as wine, meat and beetroots grew much faster than cereal production. The salaries of agricultural workers rose slightly more rapidly than those in the other sectors. Combined with the very slow urbanisation, this implies that agriculture represented a large share of the national income in the first half of the nineteenth century – more than 40% in the 1830s, and 37-38% in the 1850s and 1870s. The share of the population that depended on agriculture had been 66% in 1789 and 57% in 1846, which implies that there was a slight increase in agricultural production per worker (Verley 1997, 356; Molinier 1977, 80). Institutional changes during this period favoured the French peasantry, but they also slowed down the economy's structural change.¹⁴

¹⁴ However, Hoffman (1996, 194-198) argues that the French Revolution had on the whole a deleterious impact on agricultural productivity through a combination of devastations linked to warfare and troop movements, the destruction of the sources of agricultural capital and the disruption of trade.

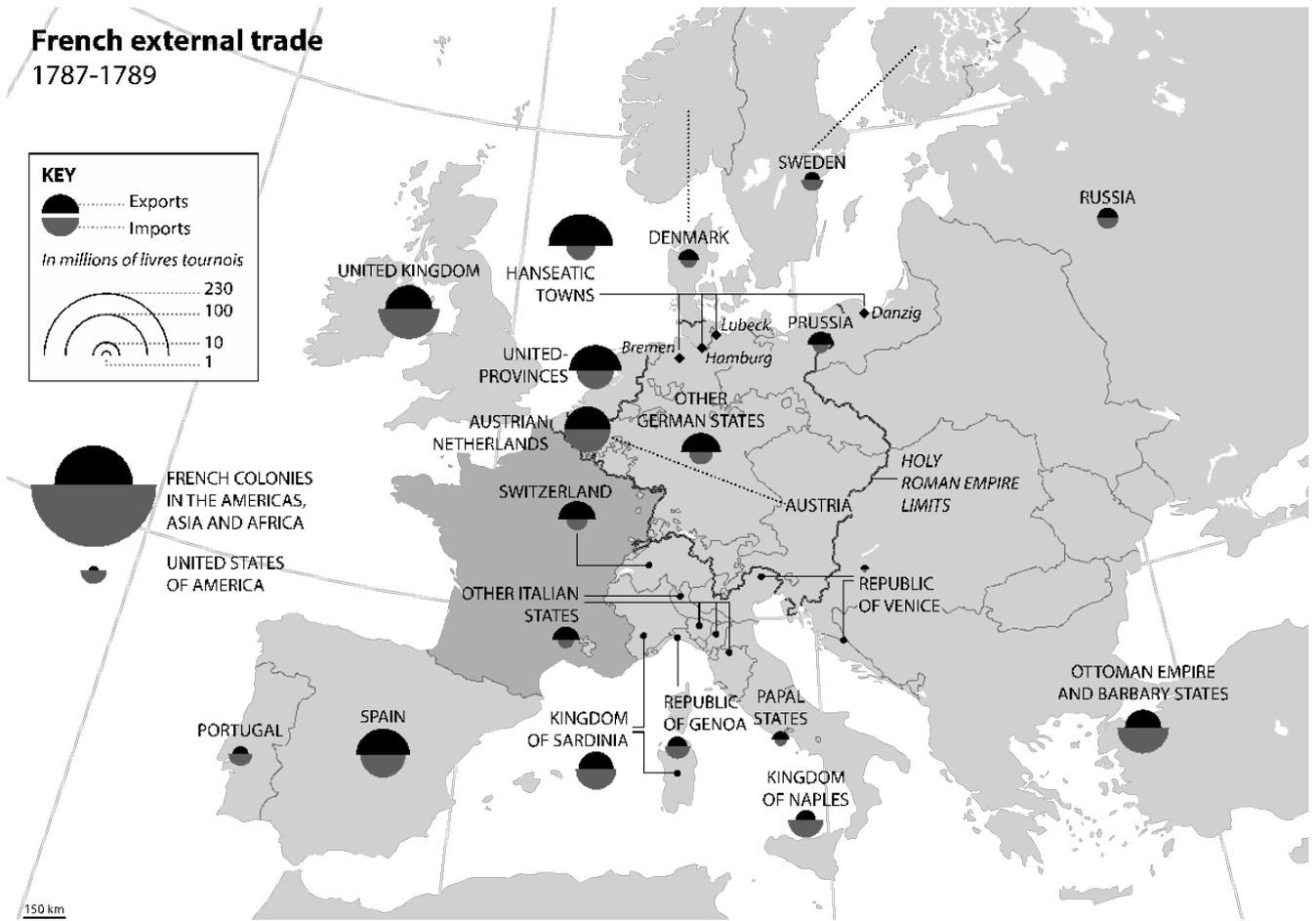
2.2. International trade

External (including colonial) trade had been a dynamic sector across eighteenth century Europe. For France, the sum of imports and exports increased from 5.5% of GDP circa 1720 to 20% of GDP in 1789 — the fastest increase in Europe (O'Rourke, Prados de la Escosura & Daudin 2010, 106). The loss of Saint-Domingue in the Revolutionary turmoil, that of Mauritius in 1815, and the other effects of war reduced this ratio to 10% in 1820.¹⁵ Steady growth barely resumed before the 1840s, and the ratio of openness achieved by the French economy in 1789 (20%) was not recovered until the 1860s. In absolute values (excluding the trade of precious metals), the mean annual value of imports and exports declined from 1 billion francs in 1787/1789 to 0.83 billion francs in 1818/1820. 30% of total exports in 1789 consisted of colonial re-exports: sugar, coffee, indigo, etc. By 1820, these trades had disappeared. Although it is difficult to assess the potential of re-exports in supporting the long-term growth and structural change of the French economy, they were an important source of trading and shipping income for merchant capitalists and their disappearance severely affected French Atlantic ports – even if, when excluding colonial re-exports from the analysis, trade was reduced by a quarter (instead of one half) in proportion to the GDP. The French share of the expanding global economy of the nineteenth century was much smaller than it could have been without warfare and defeat. The net loss for the French port cities, maritime economy and merchant capitalism was sizeable.

Maps 3.1 and 3.2 illustrate the evolution and geographical transformation of the French external trade.

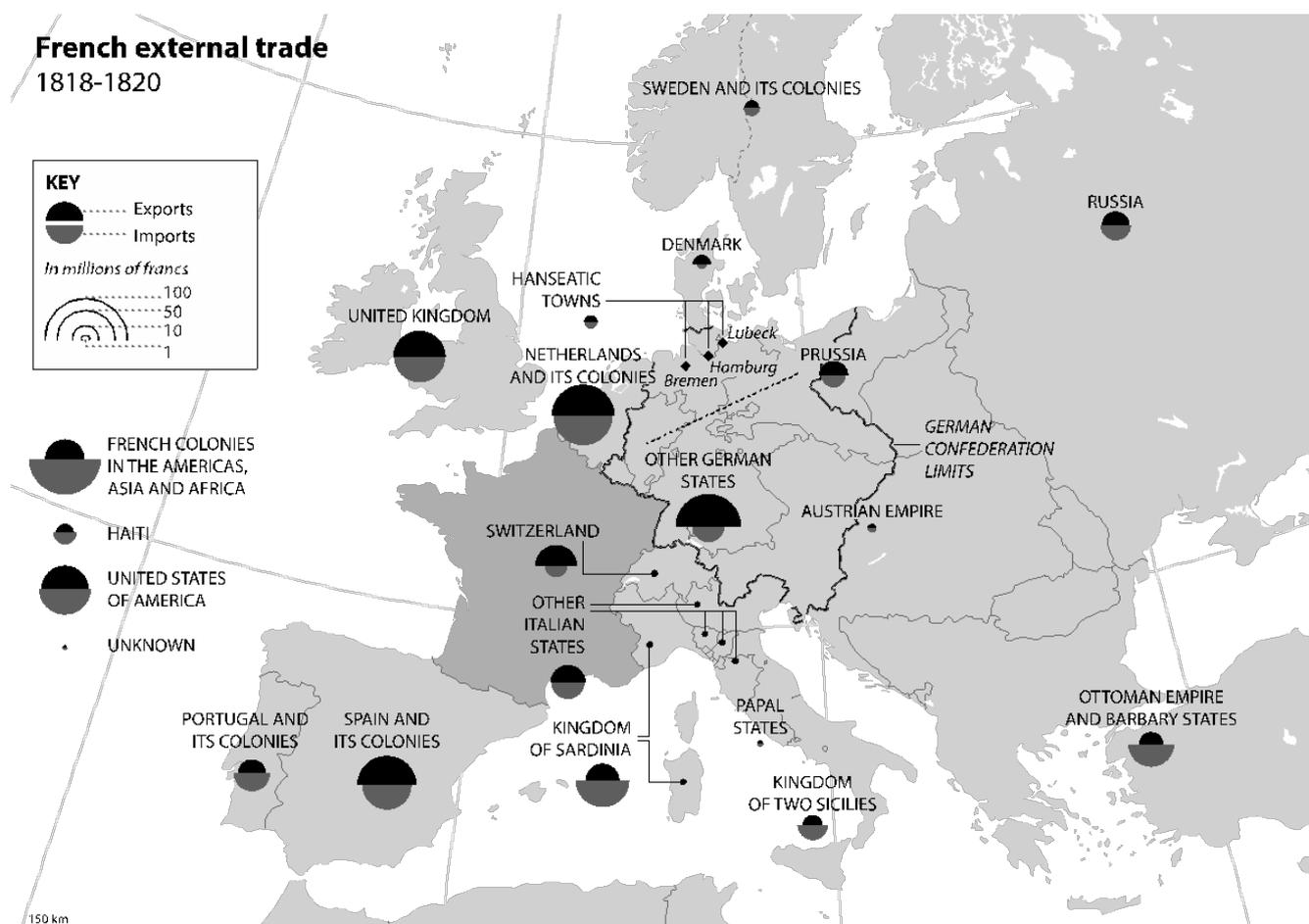
¹⁵ To some extent, the decline of the first French colonial empire began even before its peak with the loss of Newfoundland in 1713 and that of Canada in 1763. However, the losses associated with the 1792-1815 period were much more significant for external trade. They included the loss of markets in India and other places that were incorporated into the British empire.

Map 1: French external trade, 1787-1789



Sources: Archives Nationales, Paris (hereinafter AN) F12 251, authors' computations.

Map 3: French external trade, 1818-1820



Sources: AN F12 251, authors' computations.

The geography of trade changed, even if we exclude colonial trade and re-exports of colonial commodities (Table 3.1). The collapse of colonial trade was partly compensated for by the rise of trade with the United States. Other maritime trades declined (United Kingdom, North Africa and the Near East), whereas short-distance land trade (e.g. with 'Germany'), which had been encouraged by the Continental system, increased.

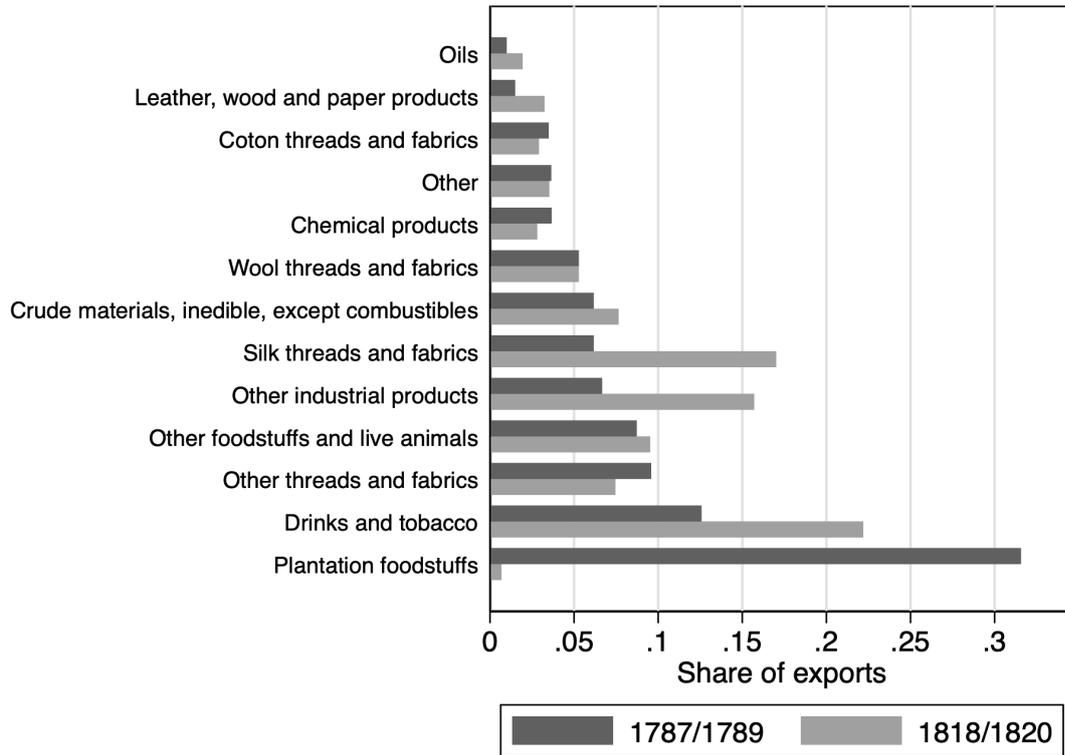
Table 1: French geography of trade, excluding precious metals, trade with the colonies and trade in plantation foodstuffs, 1787-1789 and 1818-1820

| | 1787-1789 | 1818-1820 |
|-----------------------------------|------------------|------------------|
| 'Italy' | 18% | 16% |
| United Kingdom | 17% | 11% |
| Holland (including Belgium) | 16% | 16% |
| Spain | 13% | 12% |
| Baltic, Scandinavia and Russia | 11% | 9% |
| Ottoman Empire and Barbary States | 10% | 6% |
| Land trade with Germany | 6% | 11% |
| Switzerland | 4% | 5% |
| United States of America | 2% | 10% |
| Portugal | 2% | 4% |

Sources: AN F12 250, F12 1835 and authors' computations (see TOFLIT <http://toflit18.hypotheses.org/>). The correlation is 0.65.

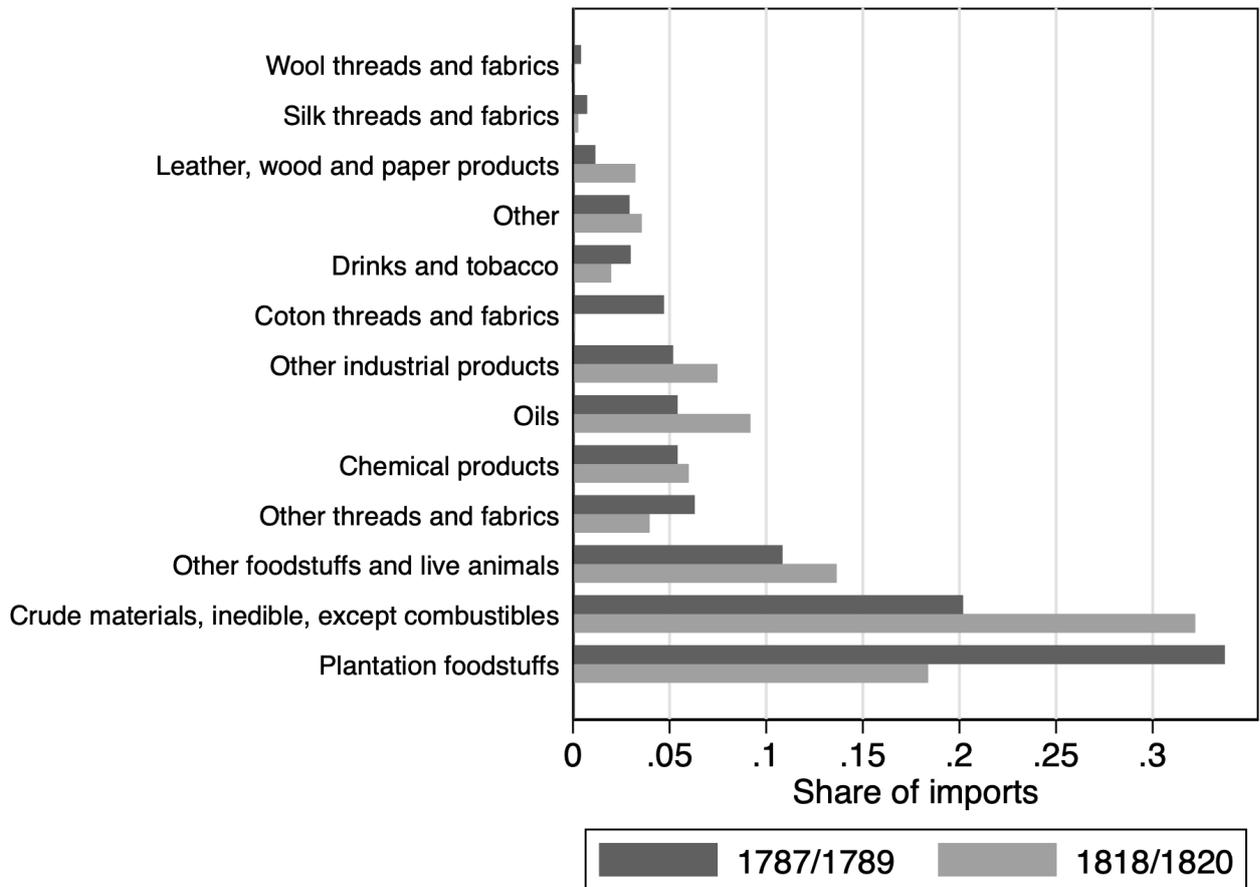
To some extent, the trade data enables us to identify structural changes in French trade between 1787/1789 and 1818/1820. The re-export trade of plantation foodstuffs virtually disappears, even though colonial imports for domestic consumption remained significant. A few aspects remained unchanged, such as the importance of wine and industrial exports, and that of raw material imports.

Figure 4: Sectoral shares of French exports,



Sources: AN F12 251, TOFLIT18, authors' computations

Figure 5: Sectoral share of French imports

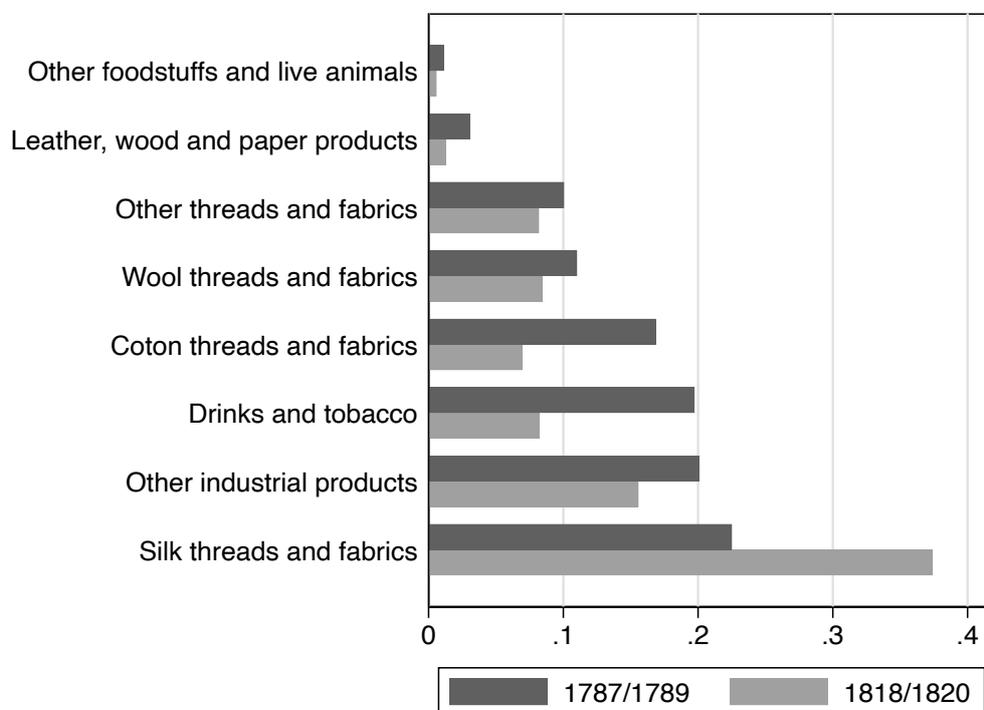


Sources: AN F12 251, TOFLIT18, authors' computations

On the eve of the French Revolution, industrial products accounted for some 53% of French domestic exports (TOFLIT18 data). This percentage was consistently lower than the ratio for Great Britain, which has led some historians to conclude that the French trade did little to foster industrialisation (Meignen 1973, 583-614; Léon 1974, 407-432). This is confirmed by the dependency rate of most French industries on external markets, which can be computed by using the value-added estimates from the ISMEA team (see Figure 3.6). This rate was relatively small and

declined further during the wars, which reinforces the argument about the rising importance of internal demand.

Figure 6: External market dependence rate of some French industries, 1787-89 and 1818-20



Note: External market dependence rate as measured by exports divided by value-added (including clothing for textile sectors).

Sources: Trade: TOFLIT18. Value-added: Toutain (1961, 212) ; Toutain (1961, 6) ; Markovitch (1966, Table 3).

The industrial transformations induced by the events of 1792-1815 can be measured by identifying the evolution of the comparative advantage of the French economy revealed through the computation of ‘Contributions to the Trade Balance’ (CTB), as formulated by Lafay in 1992.¹⁶ These

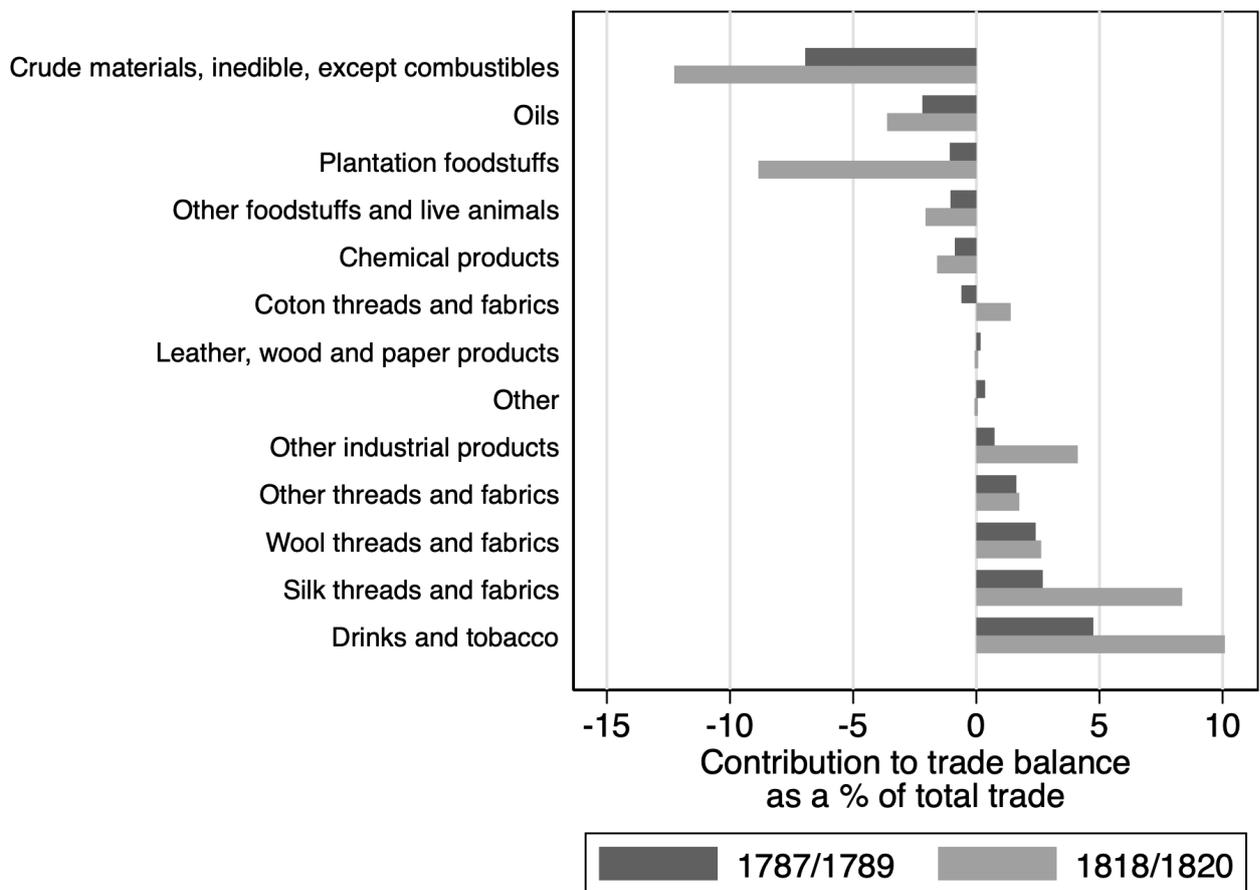
¹⁶ We prefer this measure to the more usual Balassa indicator because of the prevalence of intra-industrial trade – in most sectors, France was both an importer and an exporter (Lafay 1992, 209-234).

figures measure the trade balance of each sector corrected for the overall trade balance, so that the sum of CTBs is equal to zero. The formula is:

$$CTB_k = \frac{100}{X + M} \cdot \left[(X_k - M_k) - (X - M) \cdot \left(\frac{X_k + M_k}{X + M} \right) \right]$$

where X and M are total exports and imports and X_k and M_k are sectoral exports and imports.

Figure 7: Sectoral contributions to trade balance, 1787-89 and 1818-20



Sources: AN F12 251, authors' computations.

Figure 3.7 shows a strong continuity in France's comparative advantages. Except for the 'drinks and tobacco' sector (mostly wine), all surplus sectors were industrial, both before 1789 after 1815. The largest deficit sector was raw materials. This is consistent with the trading profile of an industrial

country. This argument is reinforced by the fact that cotton threads and fabrics moved from a deficit to a surplus sector. The Continental blockade had a positive and lasting impact on the French cotton industry (Juhász 2018, 3339-3376).

The variance of the CTB also increased during this period. This was partly due to the evolution of the total value of trade and with the vanishing of colonial re-export trade, total trade was reduced. Thus, the CTB expressed in percentage of total trade increased. But even a 30% reduction of trade cannot account for the doubling of the CTB. Somewhat paradoxically, despite its lesser integration into world trade, France's specialisation deepened after 1815, suggesting that France was then more able to exploit its comparative advantages. This might have been due to a deeper international division of labour encouraged by the Continental blockade and enforced by the Continental system¹⁷, which systematically encouraged French industrial exports and raw material imports (Chabert 1949, 303). Alternatively, it might be correlated to the fact that the more 'superfluous', intra-industrial trade, reliant on the consumers' taste for diversity, was the first victim of decreasing trade volumes.

To summarise, the analysis of the evolution of French foreign trade points to the disruptive effects of the warfare, and most notably on the Atlantic trade, causing a collapse that affected the trajectory of French economic growth. The increase of non-maritime trade suggests that the wars probably encouraged the unification of the Continental European market, which benefitted Revolutionary and Napoleonic France. This might have partly compensated for the loss of the first French colonial empire. Furthermore, the institutional construction of a unified market combined

¹⁷ While the Continental Blockade aimed to shut British trade and manufactured goods from the continent, the Continental System – a system of power relations within the continent – imposed trade treaties and duties upon vassal states and allies that aimed to secure the economic pre-eminence and international protection of French interests. On the conceptual differences see Roger Dufraisse (1966, 518-534). The impacts on different parts of Europe have been recently discussed in Johan Joor and Katherine Aaslestad (2014).

with the proactive role of the Revolutionary and Napoleonic state significantly increased the role of domestic demand for the French economy. Therefore, besides the mostly short-term negative macroeconomic effects that warfare had on the French economy and in particular on foreign trade, these wars also triggered a deep geographical reorientation of French trade toward domestic – and to a lesser extent continental – markets.

Colonial markets lost their importance for French industrial products and the rise of continental markets only partially compensated for this loss. Domestically, the redistribution of spending power from declining urban centres to the countryside shifted demand away from semi-luxury industries and towards more basic goods. Since the demand for French luxury products did not decline, a dualism emerged in the French industry. The Revolution and warfare thus witnessed a change in the structure and dynamism of the French economy. This process certainly had detrimental consequences on specific regions (Brittany and the South-West) that were previously dependent on colonial trade. On the other hand, new industries (chemicals, cotton, iron) in other regions benefited from this reorganisation.

2.3. Industry

Throughout the eighteenth century, the significant growth of the French industry had been to a large extent driven by external trade. In such traditional textile sectors as cloth and linens, the rise was steady if limited (about 1% per year), and faster before 1750 than after. The cotton, silk and iron industries were much more dynamic. The production of calicoes imitated from Asian products took off spectacularly after the removal of a ban in 1759. This link between industrial output and foreign markets was severed during the wars. Many industries suffered from the demise of the first French colonial empire and the continued difficulties of maritime trade.

The volume of the French industrial output stagnated during the 1789-1815 period. The early 1790s were extremely disruptive for the French industry. From 1793 onwards, the maritime war combined with the effects of the revolt in Saint-Domingue hit export industries severely. Furthermore, the chaotic situation in Vendée, and the violent repression of the Federalist movement during the Terror generated negative shocks for the French industrial production, for example for the woolen industry (Chassagne 1978, 143-167). The situation improved and in the years before the crisis that spelled the end of the Napoleonic regime (1812-1815), French industry as a whole recovered. In the short term, protection from British competition was decisive, particularly for the cotton industry in Alsace and Northern France (Juhász 2018). Since the data is either incomplete or unreliable, it would be difficult to provide a comparison of the total French industrial output before 1789 and after 1815. Most economic historians posit either a very moderate growth, or stagnation.

The composition of the industrial output was rather different in 1815 compared to 1789. At least two sectors – cotton and iron – experienced impressive growth as well as technological innovations. In cotton, from 1789 to 1814, the total number of mechanical mills in use in France rose from 6 to 272. This progression was not linear. From 1789 to 1799, there were few changes, but the industry changed rapidly from 1800 to 1806, although growth was negligible during the last years of the Empire. For example, the Languedoc textile industry shows that in most cases, the war-related demand sustained the production, but often at a lower level compared to the 1780s. In the iron industry, the total production increased from 600,000 tons in the late 1780s to 900,000 tons at the end of the Empire. The chemical industry also developed, but it remained a small sector. Traditional

sectors such as linen and hemp textiles were on the wane, while woollens did slightly better. Silk, however, fared much better, as did most luxury industries.¹⁸

The geographical location of industries over the French territory changed considerably. The West of France (e.g. Brittany) began to de-industrialise. Northern and eastern France benefitted from the proximity of coal deposits and continental markets, while Paris gained from the increased centralisation of economic and political power and the revival of demand for its luxury industries (Juhász 2018; Chassagne 1978; Bergeron 1978).

Without the Revolution and the wars, extra-European markets would have been kept open to the French industry, thus benefitting sectors such as the linen production in Western France. If the 1786 free trade Eden-Rayneval Treaty with Great Britain had been upheld, there is little reason to believe that France could have developed an internationally competitive cotton industry. France's cotton production would probably have been lower. This context would have been more favourable to merchants than to industrialists: this would perhaps have made France a bit more like the Netherlands which, historically, were richer but experienced their Industrial Revolution later than France or Belgium.

3. Macroeconomic trends

The decline of external demand, the rise of rural demand and the consolidation of links with continental Europe compared to overseas contributed to a wide sectoral and geographical rebalancing of the French economy. This rebalancing had an effect on macro-economic dynamics. Some sources of growth were thwarted. This section seeks to provide a better understanding of the

¹⁸ Figures for the cotton mills and iron industry come from Woronoff (1994, 193-4). For the Languedoc, see Johnson (1995).

nature of the impact that the 1789-1815 years had on the French economy, considering the longer period that runs from the death of Louis XIV in 1715 to the end of the July Monarchy in 1848.

For a premodern economy such as France, the population was one of the main, if not the main macroeconomic variable. In comparison with other economic variables, the evolution of the French population over the long term is well documented. Within its 1789 frontiers, France grew from 24 million inhabitants in 1740 to 34 million in 1840 (Table 3.2)¹⁹. Table 3.3 shows that the 1790-1815 period altered a century-long trend towards an accelerated population growth (despite a slight decrease in the natality rate from 1740). Table 3.4 shows that the most significant part of the loss occurred in the first five years. From 1792-97, wars against the European coalition as well as civil strife in Western France had dire consequences for both birth and mortality rates. Moreover, there was significant emigration (around 200,000) due to the demise of the monarchy. The direct loss of French population due to the wars has been estimated at between 1.3 and 1.4 million from 1797 to 1815 according to Henry and Blayo (1975). As a result, the actual population increase was only half (0.23%) per annum of what it would predictably have been without the political turmoil – namely a natural rate of increase that could be crudely estimated at 0.44%.²⁰ This is indeed a notable if time-limited consequence that could be attributed to warfare.

However, recovery was quick. From 1795, as order was restored, the population grew again despite continuing external conflict, and it did so at a faster pace than before the Revolution despite the

¹⁹ It should be noted that 1815 frontiers were almost identical as those of 1789 but differed significantly from those after 1861.

²⁰ We obtained this figure by roughly adding up the various losses (civil and military deaths and emigration) to our total for 1815. The total population would then have been around 31,500 million instead of 29,694.

well-known, if unexplained decline of the natality rate.²¹ During the Restoration, the losses were fully made up. The annual growth rate for the 1790-1840 period was similar to that for 1740-1790.

Table 2: French population, 1740-1840²²

| Year | 1740 | 1765 | 1790 | 1815 | 1840 |
|------------------------|--------|--------|--------|--------|--------|
| Population (thousands) | 24,108 | 25,578 | 28,028 | 29,694 | 34,202 |

Source: see note 65.

Table 3: Growth of the French population, 1740-1840

| Year | 1740-1765 | 1765-1790 | 1790-1815 | 1815-1840 |
|---------------------------|-----------|-----------|-------------|-----------|
| Annual rate of growth (%) | 0.4 | 0.37 | 0.23 (0.44) | 0.57 |

Source: see text, notes 63 and 65.

Table 4: Growth of the French population, 1780-1800

| Year | 1780-1790 | 1790-1795 | 1795-1800 | 1790-1800 | 1800-1815 |
|-------------------------------------|-----------|-----------|-----------|-----------|-----------|
| Variation in population (thousands) | 1,029 | -400 | 890 | 490 | 1176 |
| Annual rate of growth (%) | 0.37 | -0.28 | 0.63 | 0.17 | 0.26 |

Source: see note 65.

When one goes into factors conditioning population growth, a pattern emerges. The mortality rate began to drop after the two major demographic crises: the 1709 famine and the 1720 plague (in Marseille and Provence) that followed the '*années de misère*'. Most of the gains resulted from the drop of infant mortality rates, at least until the end of the eighteenth century, and were linked first and foremost to the disappearance of the mortality peaks associated with poor harvests.²³ This

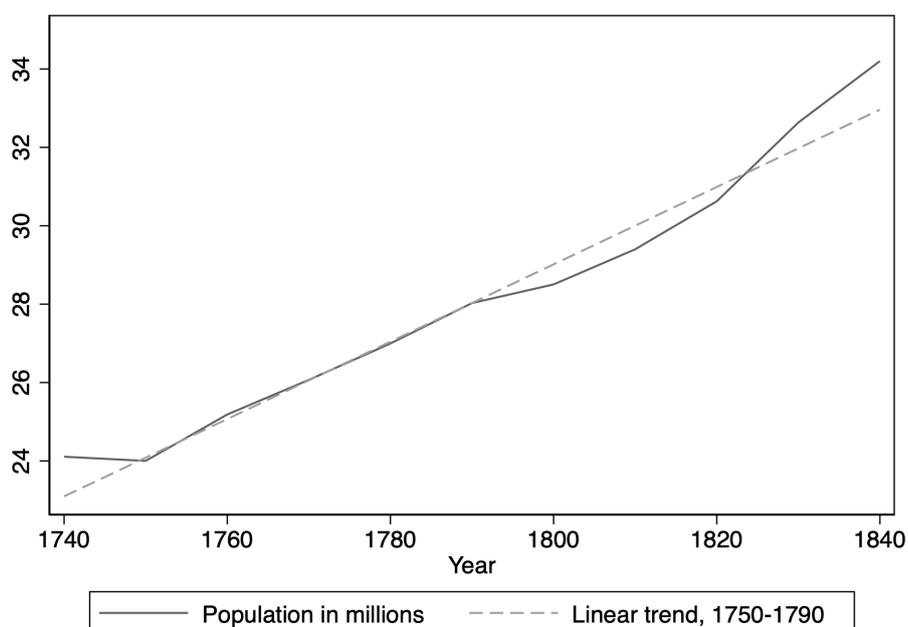
²¹ Conscription, introduced in 1798, increased the marriage rate (as married men were not called to serve the army), and thus natality rates. For a detailed case study, see Jean-Pierre Bois (1976, 467-493).

²² We calculated the data from the following sources: Jacques Dupâquier (1988); Henry and Blayo (1975). The evaluation of losses due to emigration is from Dupâquier (1988, 76) and that of those due to military losses is from Henry and Blayo (1975, 104-107). The various estimations of civil losses for the 1790-1795 period, especially in the Western part of France, are messy at best, since the records are unreliable in this period of quasi-civil war. Reasonable estimates go from 200,000 to 400,000 casualties (including disease outbreaks).

²³ Since the last quarter of the eighteenth-century, inoculation campaigns also positively affected mortality rates.

trend continued throughout the whole period, without being significantly altered in the long term by the short-term mortality crises caused by the Revolutionary turmoil and Napoleonic wars. Finally, the natality rate moved more slowly and began to drop in the 1740s, much earlier than anywhere else in Europe. This decline accelerated from the 1790s onwards. This ultimately accounted for the progressive slackening of the growth of the French population from 1840 onwards. All in all, the analysis of the long-term evolution of the French population suggests that warfare had a sizeable short-term impact but a much smaller effect on the long term.

Figure 8: French population growth, 1740-1840



Source : see note 65

The French population growth was significantly lower over the whole period than in other European countries, particularly England. The difference was limited during the first part of the eighteenth century, when only England and Russia significantly outperformed France. The 1789-1815 period represented a turning point, when the growth rate of the English population doubled (from 0.65 per cent to 1.3 per cent) and remained more or less at that level throughout all of the nineteenth

century. By 1815, the population of the German states also began to grow at a much faster pace than the French population (Bardet & Dupâquier 1998, 291 (England) and 406-407 (France)). These discrepancies had major implications in terms of economic growth, since they resulted in a relative slackening of French internal demand compared to the other North and West European regions, although France was still the most populous country in Europe (excluding Russia). In a counterfactual France that would not have experienced the Revolution and warfare, we have little evidence that the evolution of the total population would have been different. However, the lesser reliance on the domestic market would have meant that the consequences for the French industries would have been milder.

The strong impact of the French Revolution on the urbanisation of the French population also contributed to the relative weakness of French internal demand. Again, it seems that the crucial period is situated before 1806 and that the Napoleonic wars had by far a lesser impact than the political turmoil caused by the Terror period and, in particular, the civil war that plagued large parts of the French territory from 1793 to 1796. From 1780 to 1806, the combined population of the 10 biggest French cities practically stalled (1.256 million compared to 1.215 million in 1780). Growth started again in the 1800s, but as a whole the proportion of the population living in cities decreased slightly from 1789 to 1815 and only grew very slowly after 1815. The French rate of urbanisation (i.e., the share of the population living in cities of over 2,000 inhabitants) can be estimated at 18% in 1740, 20.5% in 1790, 19% in 1806 and 21.5% in 1836 (Lepetit 1988, 399). Major Atlantic port cities such as Bordeaux and Nantes, which enjoyed a rapid growth during the eighteenth century, never recovered their dynamism in the nineteenth century (Lepetit 1988, Appendix 2). Demographic and urbanisation factors are important since, besides France, all the countries or regions that underwent a slower demographic and urban growth during this period (including the

Netherlands, Spain, Portugal and Italy) experienced a significant economic drop compared to more dynamic regions (England, Switzerland, Belgium and even the German states), probably because of the importance of agglomeration effects during industrialisation.

There is no consensus on the evolution of the French gross product. Data for the pre-1789 period was published by the ISEA in the early 1960s and revised in the 1990s. This data was based on contemporary estimates (Molinier 1957, 875-897; Marczewski 1961, 369-86). Evidence is weak, but Morrisson and Daudin produced plausible conjectures for the growth of GDP in the 1715-1789 period: 0,6% (Daudin 2005) and 0.4% (Morrisson 2007, 153-165). The lower bound estimate assumes that it was equal to the rate of population growth, or 0.3% per annum.²⁴ Although Leonardo Ridolfi recently argued in his Ph.D. thesis that the French GDP per capita stagnated during the eighteenth century, his argument goes against the grain of both quantitative and qualitative evidence (Ridolfi 2016 and Ridolfi 2019). The only macroeconomic variables we can rely on, thanks to a wealth of contemporary sources, is external trade. It grew at a fast pace both in absolute terms (2.25% per annum) and per capita terms (1.95%) from 1715 to 1789. Moreover, it has been established that the end of famine-related mortality crises after 1709 was a sure sign of the increase of the French standard of living (Daudin 2005, 218-220; Braudel & Labrousse 1993, 693-708).²⁵

The consensus among economic historians is however that growth decelerated from 1789 to 1815. This was not because of material losses. Despite the seizure of ships, and the loss of private property in Haiti, war was not as destructive then as it was to become in the twentieth century, and moreover, it was fought on French soil only at its very beginning and end. For part of the Napoleonic period (1803-1812), Toutain calculated an annual GDP growth of 0.41%, which is barely more than

²⁴ Daudin (2005) selects 0,24%, but he uses figures from Henry and Blayo (1975): this article uses reevaluated figures from Dupâquier (1988).

²⁵ See above for detail on external trade and agriculture production.

the demographic growth rate. Evidence seems to indicate that, at best, the same GDP per capita rate prevailed during the Revolutionary years, but both the disruption in the state's statistical apparatus and the hyperinflation render a precise evaluation impossible. According to Toutain, this trend continued for some time during the Restoration period with a mere 0.11% GDP growth per capita for the decade 1815-1824 (Toutain 1997, 18-19). This rate accelerated again in the subsequent decade and stayed at a high level until the political and economic crises of 1848. The overall trend is therefore very similar to what we found when analysing the evolution of the French population. The period provoked an important deviation from the French economy's long-term trend, but this alteration was only temporary. However, compared to Britain, the important point is that French growth did not accelerate. The differential in income per head that increased from 1789 to 1815 persisted until the early twentieth century. French gdp per capita was 75% of the British one around 1789 and only reached the same level around 1900. (Bolt *et al.* 2018)

Conclusion

The Revolution and Napoleonic Empire altered French economic development in very significant ways. Whereas before the Revolution, the French economy was more and more open to external trade, by 1815 the picture had changed dramatically. External trade had been shattered by more than two decades of war and blockades, and most of the dynamism of the French economy had been transferred from coastal ports and regions to the interior, making way for what the historian Edward Fox has labelled the 'Other France' (Fox 1971; Crouzet 1964, 567-588). Structural change comes at a cost, and growth was slow 1789 to 1815. Furthermore, due to the redistribution of land and the transformation of the tax system, the foundations of French growth had changed. While in eighteenth-century France, industrial consumption was mostly driven by a combination of foreign trade and increasingly rich and numerous urban elites, both noble and non-noble – a model with

strong similarities to England. After 1815 the income and consumption of peasants was the main source of demand for French industrial products. In effect, the growth of the French economy throughout the nineteenth century was sustained by internal demand, and the main part of it stemmed from the rural population rather than the urban bourgeoisie. This made the slow demographic growth of France more of a handicap than it could have been. Due to the slow growth of the French population and urbanisation rate, absolute growth was less dynamic in France than in other European countries such as Belgium, England, Switzerland and Germany. This was a case of too much structural change rather than too little.

That being said, we have found it difficult to devise a counterfactual. The Revolution and the Empire deeply shaped France, and it is difficult to imagine the country without these events. More fundamentally, devising a counterfactual requires to pass judgement on the political, social and economic sustainability of the Old Regime, which was based on internal privileges and on slavery in the colonies. Although the history of nineteenth century Central and Eastern Europe and that of the Southern United States show that its quick demise was not inevitable, it is doubtful that such a system was compatible with modern economic growth in the long run. Still, the geographical and structural break introduced by the Revolution and the Empire and its associated costs were not necessary to the transformation of France into a modern economy. One could imagine a more gradual process that would not have engulfed Europe in war.

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