

THE QUANTITATIVE DEVELOPMENT OF GERMANY'S INTERNATIONAL TRADE DURING THE EIGHTEENTH AND EARLY NINETEENTH CENTURIES

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The study assembles indirect evidence to establish the patterns of international trade in eighteenth-century Germany. Major results include: (1) International trade of Germany expanded at an annual rate of 1 per cent or slightly less in real terms between the 1730s and the early 1790s. Since GDP grew by about 0.5 per cent p. a. this implies an increase in openness. (2) Imports of colonial goods, most notably sugar and coffee, expanded at slightly less than 2 per cent p. a., which suggests that Germany participated in the development of the Atlantic economy. (3) The period saw import substitution of cottons, and towards the end of the eighteenth century exports of cotton goods partially compensated for sluggish growth of trade in linen, the chief export product. Trade growth seems to have resulted from an increased utilization of seasonally underemployed labour for the production of manufactures for export and contributed to the stabilization of per capita incomes in face of declining marginal labour productivity in agriculture.

Keywords: eighteenth century, international trade statistics, Germany, globalization, economic history.

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1. Introduction

Two issues motivate this research; the first relates to economic growth, the second to divergence.

An emerging consensus holds that economic growth, albeit limited, occurred prior to industrialisation (e. g., van Zanden, 2002). Technological advance in manufacturing was no prerequisite for detaching material welfare from population size. Smithian growth resulting from the expansion of long-distance trade constitutes a possible interpretation of pre-industrial growth experiences: Trade promoted regional specialization, which in turn increased the efficiency of factor allocation and permitted the exploitation of learning curves (e. g., Kelly, 1997; Crafts, 2011). Hence, one would like to know to what extent pre-industrial economic growth went together with an increase in openness and whether shifts in the commodity composition of international trade reflects an intensification of labour division among regions and larger geographical units.

A concept intimately connected with Smithian growth is the Industrious Revolution (de Vries, 2008). Given love-of-variety preferences the expansion of intercontinental trade during the early modern era increased the utility of consumption through the multiplication of types of goods available to European consumers. To satisfy their own demand for consumer goods households were prepared to increase their labour effort per capita at a given wage to produce more market goods fetching a monetary income. Given constant arable surface and a declining marginal product of labour households applied their incremental labour input primarily in the non-agricultural sectors producing tradables. Hence we would expect an increase in openness taking place in the form of a parallel growth of imports of consumer goods and of exports of manufactures produced in the framework of the domestic system (proto-industries).

The notion of the Great Divergence between China and other major Asian economies on the one hand and the western parts of Europe on the other hand is related to the idea that Western Europe controlled land resources in the western hemisphere whose resources could be exploited in creating an industrial sector;

China, by contrast, lacked such an opportunity (Pomeranz, 2000). More recent research suggests that income divergence between the leading European economies and the large Asian countries predated the onset of industrialization (e. g., Broadberry and Gupta, 2006). Thus, to test the argument of the Great Divergence one would like to know whether the share of new world goods in long distance trade increased during the early modern period and to what extent commodities originating in the Americas constituted substitutes of European goods whose supply was constrained by land scarcity.

Existing research has discussed these issues mostly with regard to the most developed economies situated in the north-western part of the European continent. This study extends the perspective to Germany. This country presents an interesting contrast in two respects: First, much of Germany constitutes an inland economy with limited access to sea transport. Neither did it exert control over nor did it entertain direct trade relations with territories in other continents. It will be interesting to see, therefore, to what extent Germany was linked to Atlantic trade and felt its effects posited by the Industrious Revolution and Great Divergence theses. Second, income per capita probably stagnated during the second half of the eighteenth century, and the real wage of unskilled urban workers fell (Pfister, 2011, 2014). A study of growth and patterns of trade holds the potential to show to what extent an increase of the labour effort per capita in the non-agricultural sectors producing goods for export served to mitigate the effect of a falling marginal product of labour on household income.

The two existing surveys of Germany's external trade during the late eighteenth century have been written more than half a century ago by Zorn (1961) and Kellenbenz (1964). Their focus lies on a discussion of sources, the organization, the institutional background and the routes followed by international trade. By contrast, this study aims at a quantitative assessment of eighteenth-century trade, including a comparison with developments during the early nineteenth centuries. Such an enterprise must cope with the challenge resulting from the virtual non-existence of contemporary trade statistics. Rare exceptions include aggregate figures for Bavaria and a database of individual import declarations in Hamburg. To arrive at a consistent picture of the growth and the

composition of Germany's foreign trade from c. 1730 these pieces of evidence are combined with balance sheets for particular territories covering isolated years, transaction volumes of markets serving purchase of export goods and information from other countries concerning their trade relations with German lands. Whereas future research will hopefully expand the body of evidence assembled here the study demonstrates that such an eclectic approach arrives at meaningful statements on Germany's external trade regarding the general issues raised at the beginning.

The text is organized as follows: Section 2 describes the main sources used for the later analysis, and section 3 presents an overview of principal results regarding the evolution of openness based on aggregate import figures. Sections 4 and 5 devoted to Bavaria and Hamburg, respectively, analyse aggregate data in greater detail, again with an emphasis on imports. Sections 6 and 7 add evidence on exports. Isolated balances are used to establish the prevailing patterns of export composition at the end of the eighteenth century, and time series for principal exports serve to explore trends over time. Section 8 concludes.

2. Sources

In his study covering the external trade of Germany during the four decades prior to the creation of the national customs union (*Zollverein*) in 1834 Kutz (1974: 10-1) opts for simply not using German sources and relies on the statistics of trading partners instead. The reason for this choice is, first, the paucity and poor quality of German data and, second, the fact that German sources often do not distinguish between trade with other German states and trade with non-German territories. By contrast, data from other countries usually consider German states as a group when describing geographical patterns of trade. Nevertheless, it is difficult to render trade statistics of several countries comparable, and Kutz's investigation actually leads to a series of largely unconnected stories of bilateral trade relations. Only for the benchmark year of 1830 do we get an estimation of total foreign trade, of its geographical distribution as well as the commodity composition of trade.

The paucity of German sources relating the eighteenth century lets Kutz's choice appear as the most natural option for the study of

external trade during earlier periods as well. Thus, later sections will make use of information on the bilateral trade between Amsterdam and her German hinterland in 1753 and in 1789-1799, respectively (van Nierop, 1915, 1917), to derive conclusions concerning the evolution of trade between Germany and the United Provinces during the second half of the eighteenth century. The ongoing reanalysis of French trade statistics may render it possible to give an account of the trade relations between this country and Germany in the near future (*cf.* Charles and Daudin, 2011). The fact, however, that the availability and quality of trade statistics is far from satisfactory in Germany's trading partners during the second half of the eighteenth century makes it advisable to exploit German sources as much as possible. Hence, the general approach followed by the present study is to abandon the ambition to create external trade statistics in the modern sense. Rather, the endeavour is to develop series that can be taken as valid proxies both for aggregate trends and shifts in the commodity composition of trade.

Bavaria is the only territory that systematically collected information concerning the value of cross-border trade from 1765 (Schremmer, 1966; see below, section 4). Furthermore, the return of duties levied on cross-border trade can be used as an indicator of real trade quantities, since tolls were specific and rates remained stable over time. Only aggregate figures are known; hence, it is impossible both to conduct a critical discussion of the source and to carry out a disaggregate analysis on the level of individual commodities. This also implies that it is not possible to distinguish between trade with other German states and international trade. Since all neighbours of Bavaria were members of the Empire at that time information on this state gives an indication of cross-border trade among German states rather than trade between Germany and the outside world.

Other German states that in one way or another began to assemble information on trade from the middle decades of the eighteenth century include Prussia, Hannover and Württemberg (Kutz, 1974: 9). However, the material collected in Württemberg seems to have consisted largely of periodic reports that lacked a consistent methodology; only after the creation of a statistical

office in 1820 did a systematic description of cross-border trade develop (Krauter, 1951: 231-235; Walter, 1990: 402-405).

For Prussia information concerning the eighteenth century is similarly limited to scattered and inconsistent lists published by Behre (1905: 337-358). On the background of a mercantilist perspective of economic growth late eighteenth-century state officials collected a great body of information on the manufacturing sector. The resulting *Fabrikentabellen* have been analysed by Kaufhold (1978); in some cases they contain information on manufacture exports. A balance of total exports and importance was established in 1795/6 (see below, section 6). Only from 1802 were statistics on foreign trade established on a regular basis; it appears that these sources have not been analysed so far.¹ Beyond scattered aggregate figures for individual years series relating to purchases and exports of linen in particular regions constitute a valuable source on eighteenth-century trade. The most important body of data refers to Silesia, where export values disaggregated according to destination have been published by Zimmermann (1885). For Westphalian regions there exist series concerning the number of pieces of linen purchased on specialized linen markets. Since the function of these markets was to channel and certify linen for export these series can be interpreted as indicators of export quantities. Section 7 below assembles this information to produce an assessment of the aggregate trend of linen exports from Silesia and Westphalia.

A wealth of archival information relating to trade in Hannover and minor territories that today form part of Lower Saxony has recently been inventoried (Kappelhoff and Deggim, 2011). Existing research based on this material relates to trade with coffee and receipts of toll stations, respectively (Albrecht, 2000; Obal, 2000). Below I shall use the latter study to test the consistency of import data for Hamburg.

1. The principal sources conserved in the Geheimes Staatsarchiv-Preußischer Kulturbesitz Berlin include II. HA Gen.Dir., Abt. 25 Fabrikendepartement, Tit. 31, Nr. 47 (Balancen von der Fabrikation... und des Absatzes, 1779-1805), Nr. 89 (general balance of 1795/96); II. HA Gen.Dir., Abt. 24 Generalakzise- und Zolldepartement, Abt. A, Tit. 43, Sect. 6, Nr. 1-3 (balance of trade 1802-1806), I. HA, Rep. 151 Finanzministerium, III, Nr. 738-742 (regulations concerning the compilation of trade statistics and trade balances 1806-1818).

The nature of information available for port cities, which constituted largely autonomous political communities, differs significantly from the sources surviving from territorial states. Series concerning shipping flows have been compiled for the major Hanseatic ports, that is, Bremen, Lübeck and Gdansk (Vogel, 1928, 1932; von Witzendorf, 1951). It is not easy to infer trade volumes from ship movement data, however. In Bremen, for instance, the number of incoming ships stagnated or fell slightly between 1755 and the end of the eighteenth century whereas imports of coffee are said to have risen by a factor of 14, those of tobacco by a factor of six and those of sugar by a factor of 5 during this era (von Witzendorff, 1951: 384, 387; *cf.* also Rössner, 2008: 84-5). Since colonial goods probably constituted the bulk of imports it is difficult to resolve this contradiction, and the following analysis does not use data on ship movements, therefore. A different and highly valuable type of information subsists for Hamburg, namely, individual declarations of import values covering a major proportion of Hamburg's overseas trade in 36 single years between 1736 and 1798. They have been digitized and published by Schneider *et al.* (2001). Despite a number of shortcomings and limitations the import declarations of Hamburg arguably constitute the most important source on the German side regarding overseas import trade during the eighteenth century (*cf.* section 5 below).

What follows uses these scattered sources to develop a hopefully consistent picture concerning the growth trend and the evolution of the commodity composition of the external trade of Germany between c. 1740 and the 1790s.

3. Overview: growth, trade and openness, c. 1753-1830

A tentative estimate of national income based essentially on an indirect estimate of food consumption and on information concerning the structural composition of the labour force suggests that real GDP per capita in Germany grew at an annual rate of 0.2 per cent during the first half and stagnated during the second half of the eighteenth century. After the 1730s the real day wage of unskilled urban workers fell steadily until the first decade of the nineteenth century. On an aggregate level, this decline must have been offset by an increase of the annual work effort and/or an

expansion of other sources of income, such as the land rent. Population grew at a fairly steady rate of a bit less than a half per cent (Fertig and Pfister, 2010; Pfister, 2011; Pfister, 2014).

This pattern of rather sluggish aggregate growth of the German economy during the second half of the eighteenth century suggests that if it is found that trade in constant prices grew faster than 0.5 per cent – the rate of population growth – or that real trade per capita increased it can be concluded that openness rose and that trade growth contributed to compensating for a falling marginal product of labour in the production of non-tradables.

Table 1 assembles information on import values measured in quantities of silver, both aggregate and in per capita terms. Two tentative approaches to measure real trade growth consist in alternatively deflating silver values with the German consumer price index and the import price index of Hamburg, respectively (on the latter, see below, section 5). Since exports of the admiralty of Amsterdam to the German hinterland are known for 1753 and 1789-1792 these years constitute major benchmarks. Imports around 1830 are shown for the sake of comparison.

Table 1. Import values and derived indicators of openness, c. 1753-1830

	Period	Total import value, tons of silver	Import value in grams of silver per capita	Import value in grams of silver per capita, constant domestic prices of 1751-55	Import value in grams of silver per capita, constant import prices of Hamburg of 1751-55
Overseas	1753	318.6	19.8	19.8	19.8
Overseas	1789-1792	695.3	37.8	31.2	27.4
Bavaria	1769-1773	69.6	48.0	37.8	44.1
Bavaria	1789-1792	64.4	47.0	38.8	34.0
Prussia	1795/6	891.0	152.5	111.9	82.6
Germany	c. 1830	2 200.4	132.6	90.4	—

Sources: Trade: Bavaria: Schremmer (1966: 241); Prussia: Behre (1905: 357); Germany: Kutz (1974: 363); overseas imports combine exports of the Admiralty of Amsterdam to the German hinterland (de Vries, 1965: 28) with imports of Hamburg (Pfister, 2012). It is assumed that toll ledgers in Hamburg covered two thirds of actual overseas imports flowing through this city (Pfister, 2012: 12) and that Hamburg handled about 71 per cent of the import trade of German ports (Jeannin, 1971: 72). — Population: Behre (1905: 462); Lee (1977: 12); Fertig and Pfister (2010: 5). Population in Bavaria is extrapolated on the basis of population in 1771 assuming a negative growth rate of -0.32 p. a. This figure corrects for population loss due to change of boundaries (Denzel, 1998: 110-1). Reference population for overseas imports in the eighteenth century is Germany in the borders of 1871 excluding Alsace-Lorraine, the three north-eastern provinces of Prussia and Schleswig; reference population in 1830 is Germany in the borders of 1871 excluding Alsace-Lorraine. — Price deflators: Domestic prices refer to the consumer price index of twelve German towns (Pfister, 2014); the import price index of Hamburg is from Pfister (2012).

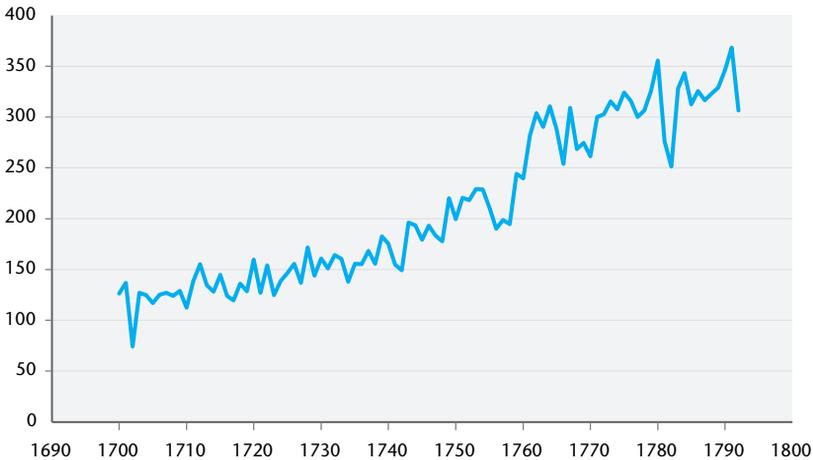
The most conspicuous result of Table 1 is contained in the first two lines that relate to trade flows between the Admiralty of Amsterdam and its German hinterland, and overseas imports of Hamburg. Figures for Hamburg are proportionally inflated to compensate for omissions and to take into account import trade of other German sea ports (see note to Table 1). Estimated overseas import values measured in tons of silver expanded at an annual rate of 2.1 per cent between 1753 and 1789-1792. As import prices in Hamburg and population increased by annual rates of about 0.9 and 0.4 per cent respectively during this period, real import growth amounted to only 1.3 per cent or 0.9 per cent p. a. in per capita terms.

Figures relying prominently on the records of the Admiralty of Amsterdam may overstate real trade growth, however. Trade between the Admiralty of Amsterdam and its German hinterland was highly imbalanced: Whereas exports into Germany are said to have increased from 11.5 to 29.1 million guilder between 1753 and c. 1790, mainly because of a spectacular growth of trade with coffee and sugar, imports amounted to only 5.0 and 5.3 million guilder respectively (de Vries, 1965: 28). As a first possibility, this implies the towering up of a huge deficit on current account. Given the short-run character of contemporary trade finance it is difficult to imagine how it could have been balanced by long-term capital movements. Thus a second possibility appears more plausible, namely, that substantial displacement of both import and export flows took place during the second half of the eighteenth century as far the trade relations between the Netherlands and Germany are concerned. By comparison, recorded overseas imports flowing through Hamburg expanded only at an annual rate of 0.7 to 0.9 per cent in real terms between the late 1730s and the 1790s, whereas real imports of Bavaria – derived from contemporary toll and excise returns – increased at an annual rate of 0.6 to 0.9 per cent during the last third of the eighteenth century (see below, section 4).

Two alternative sources support the view that values derived from the records of the Admiralty of Amsterdam may overstate import growth in north-western Germany. The first concerns the returns of the *Lastgeld* levied on Amsterdam's shipping via the Rhine. It can be considered as a proxy of the cargo space hired for Amsterdam's trade with its German hinterland and it shows a rather

low growth rate of 0.6 per cent over the period 1726-1794 (basis: five year averages; Heeres, 1988: 276). The second source is the crane tax levied by the authorities of Cologne. River transport on different sections of the Rhine depended from separate shipping organizations, and goods were transferred between the two systems in Cologne. At least for bulky goods, therefore, the tax on crane usage constitutes a proxy for trade between north-western Germany and the United Provinces (Figure 1). However, nothing is known on the institutional history of the crane tax so far; it cannot be excluded that part of the increase visible in Figure 1 is due to changes in tax assessment (Weber, 2005: 422-3). We also do not know whether the tax was assessed on the basis of the values or the quantities of the goods handled; the strong increase of tax returns in 1758-1762, which falls in the inflationary period during the Seven Years' War, points to dependence of the tax on values, however.

Figure 1. Return of the crane tax of Cologne in kilograms of silver, 1690-1794



Note: Exponential trend is 1.3 per cent ($R^2=0.91$).

Sources: Feldekirchen (1975: 286-8); silver conversion based on Metz (1990: 366-95).

Over the whole eighteenth century the return of the crane tax increased fairly steadily by an annual rate of 1.3 per cent in terms of its value in grams of silver. If one abstracts from the rather implausible upward shift in 1758-1762, which may be due to war-time inflation and/or a change in the fiscal regime, the trend is much flatter however. From 1690 to 1755 it amounts to 1.1 per cent and

in 1760-1790 to only 0.6 per cent p. a. Particularly if the tax depended not only from loaded quantities but also from the values of the goods handled or if the tax rose the growth rate of real transactions must have been considerably lower than 1.3 per cent. All this implies that the figures derived for the imports from Amsterdam and overseas during second half of the eighteenth century in Table 1 – annual growth rates of 1.8 per cent in silver terms and 1.2 per cent in real terms – mark upper boundaries of the likely true rates of expansion of Germany's international trade. Information on import trade in Hamburg, cross-border trade in Bavaria and the volume of shipping on the Rhine suggest that in real terms imports increased at an annual rate of 1 per cent or a bit less between the 1740s and the early 1790s. Nevertheless, since even this modest growth rate exceeds the rate of increase of population and – given stagnant per capita income – aggregate output, the openness of the German economy rose. The contrast between the trends of openness and the real day wage of unskilled labourers suggests that international trade contributed to mitigating the impact of declining labour productivity on income.

Apart from Bavaria, imports from Amsterdam and overseas sources can be confronted with a balance of Prussia's external trade in 1795/6 and an estimate of Germany's total foreign trade around 1830 (bottom lines in Table 1). Prussian trade in the mid-1790s appears huge, even if values are deflated with domestic consumer prices, which rose drastically following the outbreak of European war in 1792. In per capita terms, imports from Amsterdam and overseas sources amounted to only about a quarter of Prussia's imports, suggesting an important role for overland trade. The silver value of Prussia's imports per capita in the mid-1790s also exceeds by about a quarter the corresponding figure for all-German imports around 1830. If values are deflated by domestic consumer prices – there exists no import price index for the first part of the nineteenth century – the difference becomes even larger given the deflation that occurred after the end of the Napoleonic wars. However, the Prussian balance of 1795 seems to have been compiled on the basis of data supplied by individual provinces and may thus include a fraction of domestic trade. Given the lack of a systematic concept of foreign trade underlying these data, at least aggregate values should not be interpreted (*cf.* below, section 6).

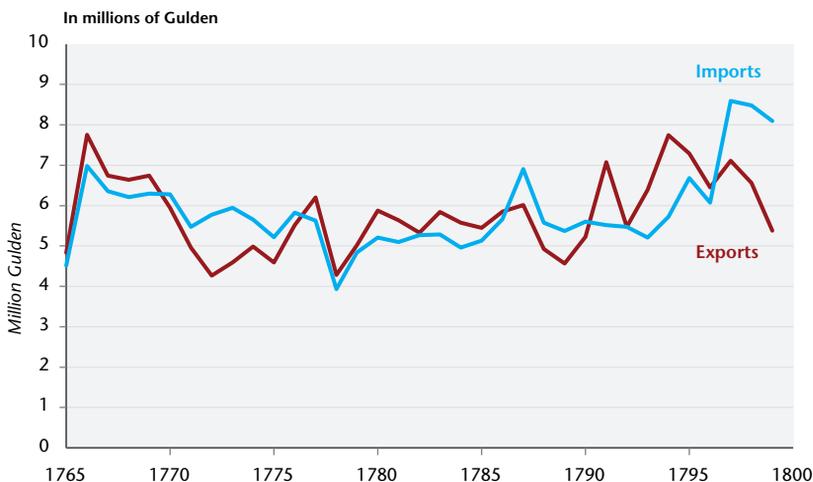
Comparison of imports from Amsterdam and overseas sources during the late eighteenth century with German imports around 1830 should take into account the limited coverage of external trade during the early period. Imports from the Netherlands, France and overseas trading partners – that is, the segment of trade covered by eighteenth-century sources – account for only 67.1 per cent of imports around 1830 (Kutz, 1974: 363), which reflects the relevance of trade with Central and Eastern Europe and Scandinavia. Hence, an assessment of the aggregate trend between 1790 and 1830 should deflate import values in 1830 by 0.671 to render the two sets of information comparable. It turns out that the silver value of imports from the Netherlands and from overseas increased by an annual rate of about 1.9 per cent in c. 1790-1830; if deflated by domestic consumer prices the growth rate of real imports amounts to 1.4 per cent. These figures are quite similar to the growth rates obtained for imports from Amsterdam and overseas sources between 1753 and c. 1790 (2.1 and 1.3 per cent, respectively). Since the pace of population growth increased in the first part of the nineteenth century (0.8 per cent p. a. in 1790-1830) and per capita incomes were possibly somewhat higher in 1830 than in 1790 openness probably expanded less between c. 1790 and c. 1830 than during the preceding half century. Very tentatively it can be concluded that between the onset of the Wars of the French Revolution in 1792 and the foundation of the *Zollverein* in 1834 Germany's external economy expanded no faster than during the preceding half-century. A slow but significant increase of openness preceded Germany's transition to sustained growth around 1820 Pfister *et al.* (2012).

4. Aggregate trends in detail: Bavaria, 1765-1799

From 1765 Bavarian authorities collected information on the value of cross-border trade. In addition, ledgers preserve the value of the revenues of tolls and excises paid when merchandise crossed the frontier. Since rates were specific and remained stable over time revenues can be interpreted as indicators of real trade (Schremmer, 1966: 231-237, 240). This interpretation presupposes that rates were meaningfully related to values and that relative prices among major commodities did not change drastically. Only aggregate figures are preserved; statements regarding the commodity structure or the geographical pattern of trading part-

ners are impossible to derive. Figure 2 gives annual series of values, whereas Figure 3 shows indices of the revenues of tolls and excises collected at the state borders in intervals of two years.

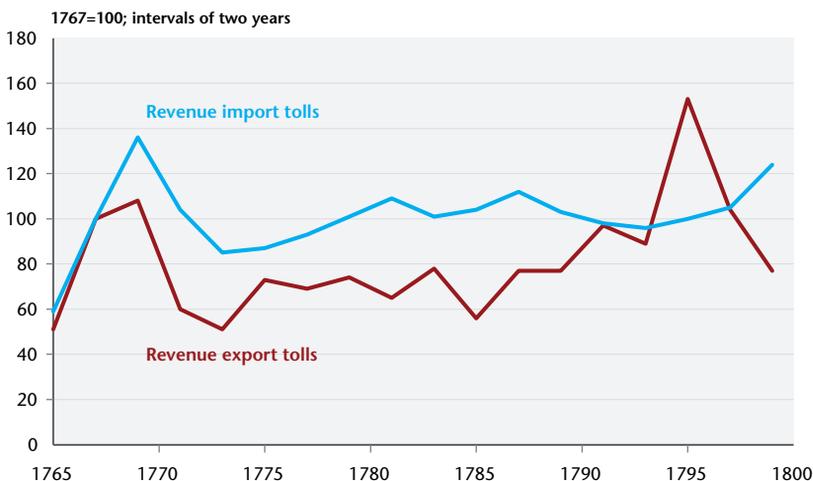
Figure 2. Export and import values in Bavaria, 1765-1799



Note: Intrinsic value of Gulden is 11.693 grams of silver.

Source: Schremmer (1966: 241).

Figure 3. Implied export and import quantities in Bavaria, 1765-1799: index of toll and excise revenues



Notes: Exponential trend of export toll revenues 1.2 per cent ($R^2=0.19$), after removal of 1795 0.8 per cent ($R^2=0.11$); exponential trend of import toll revenues 0.6 per cent ($R^2=0.15$), after removal of 1769 0.9 per cent ($R^2=0.37$).

Source: Schremmer (1966: 238).

Apart from the three years in 1796-1799 import and export values moved in parallel; over the whole 35 year period exports were only one per cent below import values. This suggests consistency of the two series as well as the impossibility of sustaining trade imbalances over longer periods at the time in question. In per capita terms import values in Bavaria in 1789-1792 exceeded those from Amsterdam and overseas only by 24 per cent (Table 1 above). This suggests a rather limited weight of overland trade among German states relative to foreign trade, quite in contrast to the – probably deficient – information concerning Prussia in 1795/96.

Figure 2 suggests that Bavaria's foreign trade stagnated during the last third of the eighteenth century (R^2 of the exponential trend is below 0.1 for both series). The indicators shown in Table 1 for per capita values corrected with alternative deflators confirm this impression; if import prices of Hamburg, which are strongly influenced by the prices of colonial groceries, are chosen as deflator real imports per capita actually declined significantly. Remarkably though, toll revenues – which should reflect the evolution of trade quantities – suggest a different picture (Figure 3): Revenues of tolls on both imports and exports rose over time; if the highest value is removed in each series the exponential trends increase at rates of 0.9 and 0.8 per cent, respectively. This corroborates the earlier statement that the external trade of Germany increased at an annual rate of a bit less than 1 per cent during the second half of the eighteenth century.

A caveat remains, however. Dividing nominal trade by toll revenues yields an implied price index for external trade. Unfortunately neither the resulting export price index nor the import price is meaningfully correlated with domestic consumer prices or import prices in Hamburg.² This suggests either a rather peculiar commodity composition of Bavaria's external trade or a tax structure that does not reflect the share of individual commodities in total trade value. Given that Schremmer (1966) was unable to find information regarding the commodity composition of trade it is unlikely that this issue can be resolved.

2. Not shown; results are available from the author on request. The conclusion in the text also follows from the contraction between Figure 3 and the values shown in Table 1.

5. Overseas imports of Hamburg, 1733/36-1798

While probably less important than Dutch seaports in handling German overseas trade Hamburg was a highly relevant gateway between inland Germany and the North Sea basin already by the eighteenth century (Jeannin, 1971; North, 1996; Weber, 2004: 37-86, 225-39; Rössner, 2008: 78-82). Accordingly, Hamburg's import toll registers comprising about 180,000 self-declarations of the value of individual commodities by the merchants who imported them by ship covering 36 complete years in 1733-1792 constitute a source of primary importance for documenting Germany's international trade at this time. This section summarizes ongoing work with this source that is based on the digital version of its modern publication (Schneider *et al.*, 2001; Pfister, 2012).

The source has three major shortcomings (Krawehl, 1991; Weber, 2000; Schneider *et al.*, 2001: 11-2; Rössner, 2008: 55-7; Pfister, 2012: 10-6). The first refers to coverage. Only goods coming into the city from overseas were liable to pay tolls, and there were numerous exemptions. Only ships coming from farther west of the mouth of the Schelde River, including the British Isles and Archangelsk, had to pay the tax. Imports from the Netherlands, the Baltic and Scandinavia are therefore not documented. Transit trade and imports of some important commodities, notably coal and grain, were exempt as well. Furthermore, there must have been significant omissions, at least on the level of some individual goods. The comparison of Hamburg's toll ledgers with figures on British exports to Germany with respect to dyestuffs, for instance, suggests a gross underestimation of trade in the former source (Engel, 2009: 151).

These shortcomings and errors notwithstanding, data given by the toll registers of Hamburg are satisfactorily consistent with information provided by other sources, at least on an aggregate level. First, comparison with reports of French consuls suggest that declared import values correspond to about two thirds of effective overseas import values and that the sources convey the same picture regarding the trajectory of two major import goods, sugar and coffee (Pfister, 2012: 13-4, based on Jeannin, 1971: 51-3). Second, total declared values in Hamburg can be compared to the toll returns of Stade. This small town was situated at the mouth of the Elbe estuary, and Hanoverian officials taxed incoming traffic there. Up to 1792 the linear fit between the two series is very good ($R^2=0.78$),

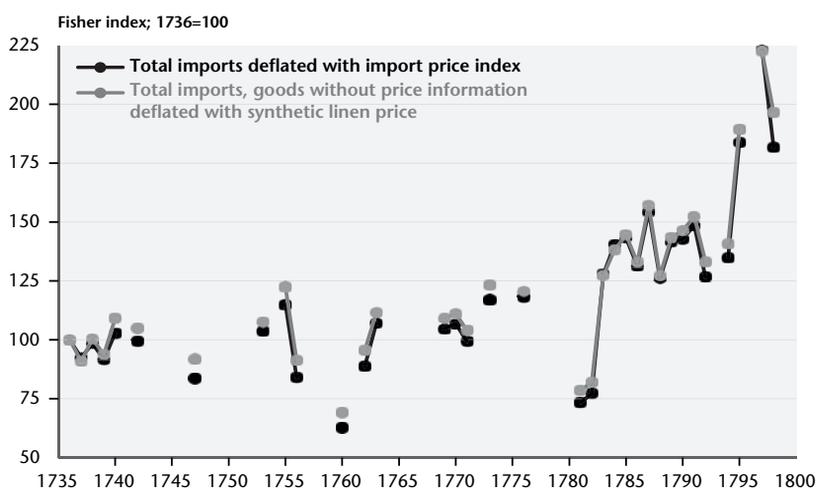
whereas after this year toll returns in Stade rise much faster than declared import values in Hamburg (data from Obal, 2000: 99). It may well be that the onset of European War in 1792 boosted Hamburg's transit trade, which was not tapped by import tolls levied by the town. The upshot of these comparisons is that until about 1790 at least import declarations in Hamburg give a satisfactory representation of the evolution of aggregate import values.

A second shortcoming refers to the prices used by merchants and officials in establishing the value of an imported good. We do not know the procedures in assessing taxable values, and contemporaries may have applied customary values or concluded gentlemen's agreements rather than referring to market prices. Third, 7 per cent of total value is made up of summary categories describing merchandise in rather vague terms, such as colonial goods, retail goods, manufactures and *drogues* (dyes, chemical and medicaments). At the same time, only about ten products or narrow categories of merchandise regularly recorded an import share of one per cent and more. Since many goods that were of minor importance in import trade could be included in one of the summary categories it follows that it is difficult to establish their import values with some accuracy. In view of an aggregate analysis the primary implications of the second and the third shortcoming relate to the precision of the import price index: weights of the prices of minor goods will be imprecise, and the stickiness of prices that contemporaries applied in fixing taxable value leads to an underestimation of import quantities in crisis years characterized by price spikes.

To assess the evolution of imports in real terms the values given in the toll ledgers are deflated by prices. An aggregate import price index is constructed as a Fisher chain index (with an adjustment of weights in every year in which import values are available) from prices for 44 commodities quoted in the price current of Hamburg (Pfister, 2012: 26-31). The present version relies mostly on prices published by Gerhard and Kaufhold (2001). Future versions of this analysis will make use of additional price information from the original source to do justice to changes in the composition of major goods, such as the shift from white sugar to cheaper muscovado. Publication of the price current started in 1736; analysis of real imports is confined to the period beginning in this year, therefore.

Commodities for which prices are available cover two thirds of total import value in the late 1730s and between 80 and 90 per cent from 1753 (except 1797). Figure 4 shows two variants of an index of real imports based on alternative assumptions concerning the prices of goods for which prices are unknown. The black graph deflates total import value by the import price index based on the 44 commodities as described above. The grey graph is obtained by deflating the 44 commodities with the import price index and the products without price information with the price index of German linen traded in Hamburg mentioned in an earlier section. The rationale behind this procedure is that the majority of imports for which no price information exists consists of textiles whereas the import price index is driven by the prices of sugar, coffee and other colonial groceries. Use of the price of German linen to deflate imported textile makes the assumption that textile markets were integrated, which is less heroic than assuming that imported textiles followed the price movement of colonial goods. In fact, the two indices in Figure 4 follow by and large the same trajectory; results are clearly insensitive to the assumption concerning the deflator of goods for which no price information exists.

Figure 4. Indices of real overseas imports of Hamburg, 1736-1798



Notes: Exponential trend of real imports, goods without price information deflated with synthetic linen price, 0.9 per cent ($R^2=0.47$), excluding years from 1795 0.7 per cent p. a. ($R^2=0.38$).

Sources: Pfister (2012: 34). Own calculation based on Schneider *et al.* (2001, digital version); Gerhard and Kaufhold (2001); additional price data from Kommerzbibliothek Hamburg S/49 (price current).

Real imports followed an exponential trend of 0.9 per cent p. a. or 0.7 per cent p. a. if the years from 1795, which saw a massive increase of real trade volumes by more than a third, are discarded (see below for an explanation). These rates are consistent with those obtained for the external trade of Bavaria. These two results combined warrant the conclusion that German imports in c. 1740-1792 (the onset of pan-European war) expanded at an annual rate of slightly less than 1 per cent in real terms.

Figure 4 also allows some observations about the short-term fluctuation of overseas imports. First, trade reacted strongly to wars: the War of the Austrian Succession (1740-1748), the Seven Years' War (1756-1763) and the American War of Independence (1776-1782), which escalated into the fourth Anglo-Dutch War (1780-1784), clearly had a negative effect on Hamburg's import trade. Note, however, that these events were also linked with price shocks in traded goods; given that the procedures followed by contemporaries in fixing import values are unknown it is impossible to determine the exact magnitude of the war shocks in real terms.

Second, the graphs in Figure 4 show a strong hike at the end of the period under study. It coincides with the French invasion of the United Provinces, the creation of the Batavian Republic and the collapse of Dutch *entrepôt* trade. This must have led to a displacement of trade between the northern Netherlands and their hinterland to German seaports. To some extent, the disaster hitting the northern Netherlands at the end of the eighteenth century constituted the basis for the subsequent emergence of Hamburg as leading port in handling German overseas trade.

Third, imports stagnated between 1755 and 1783. It is not easy to account for this phenomenon. One possible explanation refers to the temporarily unfavourable institutional environment of Hamburg's trade. Possibly as a reaction to mercantilist policies in the continental hinterland the port region of the North Sea experienced a free trade movement (or free-port movement, as early writers used to call it) in the 1750s and 1760s (Baasch, 1910a: 495, 1910b: 98; de Vries, 1959: 49). In the Netherlands, the *stadholder* proposed the introduction of a limited free-port regime in 1751 as a means to revive trade. Concrete measures were rather limited, however. In 1754 tariffs on Russia leather and indigo were abolished; in 1767 tariff reductions followed for tea, coffee and

cochenille. Bremen followed the Dutch in 1756 by abolishing a number of duties, which presumably boosted its trade (von Witzendorff, 1951: 363). In reaction to all this, the merchant community of Hamburg staged a petition to the town authorities demanding the reduction or outright abolition of a number of tariffs (1756). The lack of response on part of urban authorities may have diverted trade from Hamburg to Amsterdam, to Bremen and to satellite sea ports on the Elbe estuary, Altona in particular. The trajectories of imports of indigo and wine are those that fit well into such an account (see Pfister, 2012: 9, 37 for details).

An alternative explanation refers to real factors. A later section will find a similar pattern with regard to a major export commodity, namely, linen. Faltering export receipts may have depressed import capacity. Preliminary work on the land rent in Westphalia also show a stagnation in the major source of income of the elite during the third quarter of the eighteenth century, which may have reduced import demand. It is left to future research to disentangle the respective effects of all these institutional and real influences on the evolution of Hamburg's import trade.

Figure 5 disaggregates real imports by major commodity groups. The idea behind this is to relate the pace of German import growth – about 1 per cent p. a. or a bit less – to the experience of the wider Atlantic world whose trade expanded at about 2 per cent p. a. during the early modern period (de Vries, 2010: 718-20). Imports of colonial goods recorded in Hamburg experienced a fairly continuous expansion between the late 1730s and the 1740s at an annual rate of 1.6 per cent. Sugar and coffee dominated this trade flow with 37 and 26 per cent of average import value in 1790-1798; from 1769 colonial commodities usually accounted for more than 70 per cent of the value of taxed imports. The commodity whose estimated import quantities experienced the fastest growth was coffee with an exponential trend of 3.7 per cent p. a. Estimated sugar imports grew slower at 0.9 per cent in real terms, but this estimate mostly likely underestimates true growth as it does not justice to the shift from white sugar to cheaper muscovado over time (see Pfister, 2012: 41-2 for details). This also implies that the true growth rate of the imports of colonial goods must also have been slightly higher than 1.6 per cent.

Figure 5. Real imports of major commodity groups, Hamburg 1736-1798

Fisher indices, log scale; 1736=100



Notes: Exponential trends: colonial goods 1.6 per cent ($R^2=0.68$); Mediterranean beverages and groceries -0.7 per cent ($R^2=0.36$).

Sources: Same as Figure 4.

The great weight of colonial commodities in Germany's overseas imports during the late eighteenth century are also attested by more spotty evidence concerning Amsterdam's exports to the German hinterland as well as Bremen's trade. In 1790 colonial commodities constituted 81 per cent of Amsterdam's export to Germany via the Rhine; in 1753 this share had amounted to merely 17 per cent (calculated on the basis of de Vries, 1965: 28). Whereas quantities of sugar exported to Germany in 1789-1791 were only 59 per cent of the estimated import quantity in Hamburg those of coffee exceeded the estimate for Hamburg by 37 per cent. Finally, recall that imports of colonial goods multiplied in Bremen over the second half of the eighteenth century (von Witzendorff, 151: 384). The bottom line of this evidence is that German imports of colonial commodities must have followed more or less the general expansionary trend of the Atlantic economy between the late 1730s and the early 1790s.

The contrast between the fast growth of imports of colonial goods (probably close to 2 per cent p. a.) and the modest rate of

increase of total imports (1 per cent p. a. or slightly less) implies a marked shift of the composition of imports. In fact, Figure 5 shows that imports of goods of Mediterranean origins – mainly wine, spirits and groceries such as raisins and currants (which had constituted Hamburg's principal overseas import good in the 1680s) – followed a falling trend. Actually, tentative estimates of import demand functions suggest that Mediterranean goods whose relative price rose over time were substituted by comparatively cheap colonial goods. This supports the Great Divergence thesis with respect to luxury goods at least in that American goods were relatively less scarce than Mediterranean goods and import demand followed relative prices. At the same time, however, American goods were unable to relieve land scarcity in Germany: There are no positive cross-price elasticities of the demand for the former type of goods with respect to land-intensive non-tradables such as grain and beer. The rise of import demand for colonial groceries cannot be explained by changes in income and relative prices and thus reflects changes in preferences (Pfister, 2012: 39-46).

At least until c. 1780 the increase of imports of colonial groceries was also partly counterbalanced by a decline of imports for which no price information exists. As mentioned earlier this category consists mostly of textiles. In 1733-1742 textiles made up for a fifth of total import value, with cottons dominant (13.8 per cent); in 1781-1789 textiles accounted for only 2.6 per cent of total imports, and the share of cotton goods had fallen below one per cent. Cottons constituted fashion's favourite of the eighteenth century (Lemire, 1991); thus, the decline of import trade with these goods must reflect import substitution rather than a decline of demand. Two types of evidence support this conclusion: First, additional evidence on imports, though not necessarily on those flowing through Hamburg, suggest vigorous import growth of inputs for the cotton industry, such as raw cotton and indigo, during the second half of the eighteenth century (Pfister, 2012: 13, 46-51). Second, evidence examined in the next two sections shows that cotton goods emerged as a new export product after the middle of the eighteenth century.

6. Export structure: Prussia and Amsterdam at the end of the eighteenth century

Hamburg's import toll ledgers, despite their limitations, provide valuable insights on an important segment of Germany's import trade over a large part of the eighteenth century. Ledgers referring to exports exist as well but remain little studied so far (Weber 2000: 93–6, 106, 109). To assemble at least a minimum of information on exports the remainder of this study proceeds by two steps: The present section draws on the balance of trade of Prussia in 1795/6 and data on imports of Amsterdam from Germany around 1790 to gain a rough idea of the commodity structure of exports at the end of the eighteenth century. This provides the background for the discussion of isolated time series concerning proxies for exports of individual goods in particular places and regions over longer periods of time.

Table 2 reproduces the balance of trade of Prussia in 1795/6 as it has been established by contemporary authorities. It constitutes the earliest attempt at producing a coherent representation of foreign trade and its commodity composition in Germany. Also note that the document was drawn up after the divisions of Poland in 1793 and 1795, which brought a massive expansion of the lands ruled by the house of Hohenzollern in the grain producing hinterland of the southern Baltic. There are no known traces of primary data, and the procedures followed in data aggregation have not been discussed in extant scholarship. As mentioned in the context of the discussion of Table 1 above the balance of 1795/6 suggests implausibly high levels of trade. Since the data aggregate information provided by provincial authorities during an era when there still existed many internal tariffs it is highly probable that both external trade and internal trade crossing tariff boundaries.

were recorded indiscriminately. Sizeable exports of colonial groceries (one sixth of total exports) and of goods such as wine and indigo indeed suggest the possibility that the figures include internal and transit trade. Retained imports and exports from domestic sources must have been of considerably smaller magnitude, therefore.

Table 2. Structure of external trade of Prussia, 1795/6

(Shares in imports and exports, per cent)

	Imports	Exports
<i>Foodstuffs, beverages</i>	19.1	15.9
Grain	5.4	9.1
Meat, fish	4.9	2.2
Wine	6.4	2.3
<i>Groceries</i>	27.3	17.3
Sugar	12.1	8.4
Coffee	6.6	3.9
Tobacco	2.1	1.3
Spices	1.3	0.6
Raisins, currants	2.9	1.9
<i>Industrial inputs</i>	18.4	11.7
For textile manufacture	12.2	7.9
Raw silk	2.4	0.1
Raw wool	1.2	0.1
Flax	1.2	0.5
Flax yarn	4.9	6.2
Dyes, mordants	3.3	1.9
Indigo	1.3	0.6
Semi-finished iron goods, metals	1.7	1.5
<i>Manufactures</i>	27.6	48.1
Textiles	22.7	42.7
Silks	1.1	1.3
Cloth	2.7	9.5
Worstedes	1.3	4.0
Cottons	4.9	5.0
Raw and bleached linen	8.6	16.3
Leather	1.5	1.3
Pottery and glas	0.4	0.5
Iron and metal goods	1.5	1.9
Coarse iron goods	0.7	1.1
Fashion goods	1.3	1.3
<i>Other</i>	7.6	7.0
Total value in million Taler	(53.3)	(51.6)

Source: Behre (1905: 206-7).

Despite these shortcomings the balance of 1795/6 allows identification of major export items. Textiles are the most important category; linen constitutes the single most important good, and the importance of flax and hemp processing for Prussia's international economy is underscored by sizeable exports of yarn (probably mostly used as input for lace making in the large metropolises of the southern Netherlands). Taken together, woollens and worsteds come second. Interestingly, cottons appear as an important export commodity with their share apparently exceeding the one of semi-finished and finished iron goods (5 vs. 3.4 per cent). The contrast between the modest value of iron goods in the Prussian list and high share of this category in Amsterdam's imports (almost 30 per cent; Table 3) renders it possible that the former list underestimates exports of the western territories. If one abstracts from re-exports of colonial groceries, wine and indigo (possibly within the kingdom of Prussia) grain as well as fish and meat turn out as major export commodities apart from textiles and iron goods. Taken together, Prussian exports at the end of the eighteenth century were heavily concentrated on few categories, namely, textiles, iron goods and basic foodstuffs.

Table 3 aims at tracking German exports to the Netherlands via imports of the admiralty of Amsterdam from its hinterland via overland and river trade as well as the North Sea around 1790. The source (Nierop, 1917) describes trade flows concerning individual commodities partly in terms of values, partly in terms of quantities. For the purpose of this study the import quantities of four major goods were converted into estimated values using prices from the price currents of Amsterdam and Hamburg (see note to Table 3). The sum of the estimated import values of individual commodities amounts to four fifth of the total given by de Vries (4.2 vs. 5.3 million *guilders*; de Vries, 1965: 28). Thus, an important segment of German exports is missed out, and the preliminary character of the figures presented in Table 3 should be stressed.

Table 3. Structure of imports of Amsterdam from Germany, 1789-1791

Shares in per cent	
Raw materials	9.0
Potash	1.3
Copper	2.2
Lead	1.8
Lead oxide (<i>Blausef</i>)	2.5
<i>Drogerijen</i>	1.3
Semifinished goods, industrial inputs	46.3
Glas	4.1
Rags (for papermaking)	3.3
Semifinished iron goods (includes nails and wire)	20.9
Wood, wooden goods	8.3
Yarn	9.6
Textiles	23.7
Linen	17.9
Cotton goods	4.6
Stockings, hats	1.3
Other finished goods	12.3
Guns	1.0
Other iron goods	7.7
Retail goods (<i>kramerij</i>)	3.5
Other	8.6
Total value in million guilders	(4.2)

Note: Origins of imports of the Admiralty of Amsterdam refer to river and overland trade with north-western Germany and overseas imports from the southern coast of the North Sea (*Kleine Oost*).

Sources: van Nierop (1917), digitized by George M. Welling <http://www.let.rug.nl/~welling/paalgeld/appendix.html>. Values of quantities of iron wire, semifinished iron goods, copper and lead were estimated using prices for iron wire, Swedish iron and Norwegian copper quoted in Amsterdam (Posthumus, 1946, vol. 1, items #184, #168 and #174) as well as of lead from Goslar quoted in Hamburg (Gerhard and Kaufhold, 2001: 296).

It should also be borne in mind that the absolute magnitude of the trade flows documented by the Prussian balance of trade and the Amsterdam toll ledgers differ widely, even if it is acknowledged that the Prussian figures are probably inflated. In silver terms, Prussian exports in 1795/6 amount to 861 and Amsterdam's imports from Germany c. 1790 to 51 tons of silver. Also recall the fact that in the case of the trade of the admiralty of Amsterdam with the German hinterland imports amounted to merely one sixth of exports. This suggests that a major and possibly increasing proportion of German exports to the Netherlands did not reach Amsterdam or escaped assessment by its toll authorities.

Despite these shortcomings and caveats Table 3 holds interesting information concerning the export structure of north-western Germany, which emerged as a major early industrial region during the first half of the nineteenth century. The relative weights of iron goods and textiles are reversed compared to Prussia's export structure. Even if Prussian figures possibly underestimate exports of iron goods this reflects both the regional structure of industry in north-western Germany and presumable patterns of import demand in Holland, which possessed more proximate sources of linen goods. Notable is the confirmation of the early role of cottons in German exports; their share is the fourth highest after linen and flax yarn, semi-finished and finished iron goods, and wood.

Wood does not turn up in Prussian exports but seems to have constituted an important element of German export trade during the pre-industrial era. In particular, the Rhine and its tributaries formed an important basis for provisioning the Netherlands with timber. However, wood imports from Germany recorded in the toll ledgers of the admiralty of Amsterdam consist mainly of semi-finished goods such as planks, rods and masts as well as simple finished goods, notably vats. Rafts arriving by river amounted to only 0.1 per cent of total import value in 1789-1791. Wood rafting ended in Dordrecht rather than Amsterdam, however, and in 1789-1791 wood having descended the Rhine that was auctioned in Dordrecht valued 311 thousands guilders on average. Actual import values may have amounted to the double of this figure, which is of an order of magnitude of ten per cent of the total value of Amsterdam's recorded imports from Germany (Ebeling, 1992: 79-93, value of annual wood exports calculated on basis of the data given on pages 206-26). The case of wood exports thus constitutes a good example of the way in which the Amsterdam ledgers misrepresent trade between Germany and the Netherlands.

It is not easy to go beyond establishing export patterns prevailing at the end of the eighteenth century by identifying trends concerning both aggregate exports and exports of major commodity groups. For this reason, the next section focuses on individual commodities. Starting from the information presented in Tables 2 and 3 some indications can be given nevertheless. Imports of Amsterdam from Germany around 1790 can be compared with

import patterns in 1753 (van Nierop, 1915). As already mentioned above, the value of recorded imports virtually stagnated between 1753 and c. 1790 (5.0 and 5.3 million *guilders*, respectively). Since we do not possess a price index of Amsterdam's imports it is impossible to determine whether real exports of Germany to Amsterdam stagnated as well, but given known price indices (Table 1 above) it is safe to conclude that growth of this trade was small at best. On the level of individual commodities two experiences stand out: The value of cotton goods increased more than threefold from 1753 to 1789-1791, implying an annual growth rate of 3.5 per cent. However, cottons substituted linen; the value of the two products combined was slightly lower in the latter compared to the former year. Second, in terms of weight imports of iron rods, sheet and nails increased at the equivalent of 1.8 per cent p. a. To a major part this was compensated by a decline of imports of copper, however. Finally, exports of wood via the Rhine to Dordrecht, after having followed a rising trend over much of the eighteenth century, fell off drastically from the second half of the 1780s so that their level was rather lower around 1790 than during the first half of the 1750s (van Prooije, 1990: 59; Ebeling, 1992: 84-5).

The Prussian balance of trade of 1795/6 can be held against a contemporary compilation of figures from *Fabrikentabellen* relating to exports of major categories of manufactures in 1781 (Behre, 1905: 356). Whereas export values changed little in the cases of silk and iron goods (-1.2 and 4.9 per cent, respectively), those of linen grew by 83 per cent, exports of cloth and worsteds more than doubled (122.3 per cent), whereas those of cotton goods rose fivefold (544.3 per cent). These figures are certainly influenced by wartime inflation; the price of linens quoted in Hamburg increased by 23.6 per cent between the two years. But even when allowance is made for inflation and the uncertainty stemming from possible changes of coverage over the two sources it appears possible that Prussia's manufacture sector experienced a boom during the first phase of the French Revolutionary Wars.

The considerable weight of textiles and semi-finished goods made from iron, wood and plant fibres in German exports during the late eighteenth century stands in stark contrast to the commodity structure established by Kutz for c. 1830 (Kutz, 1974: 366): At that time, 69 per cent of German exports consisted of agri-

cultural goods and raw materials supplied primarily to Great Britain, 9 per cent were re-exports of colonial groceries and only 22 per cent were made up of manufactures. The British industrial revolution and the differential economic growth it engendered seem to have converted Germany's position in the international economy from a supplier of semi-finished industrial inputs and relatively simple, standardized manufactures to a provider of primary commodities.

7. Exports of individual commodities

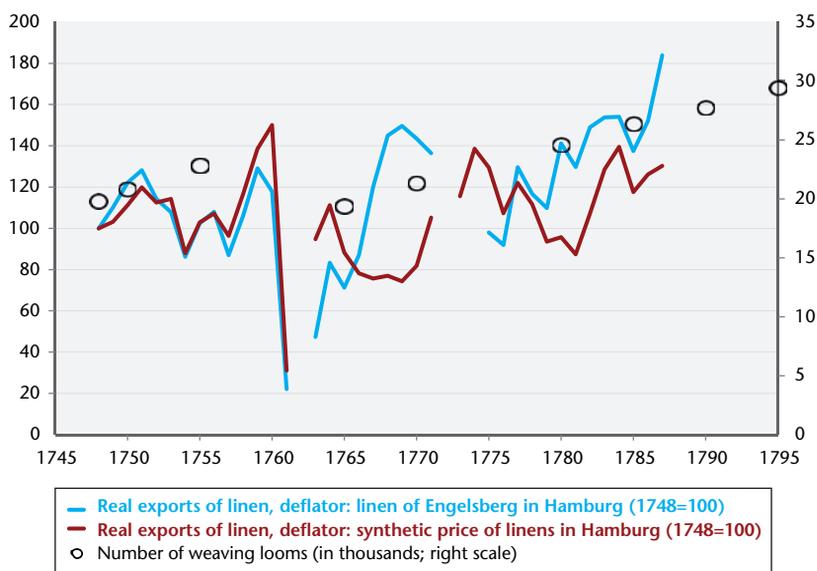
The previous section has identified linen, woollens and worsteds, cotton goods, semi-finished and finished iron goods, metals (most notably copper and lead), wood and goods made from woods as well as primary foodstuffs, notably grain, as the most import categories of exports at the end of the eighteenth century. What follows complements this general picture by short case studies on exports of important individual commodities on the regional level. These goods concern linen exports of Silesia and eastern Westphalia, worsted exports from western Württemberg and grain exports across the North Sea and the Baltic. The focus is on establishing growth rates over several decades in view of two issues. First, it will be determined whether the trajectory of exports of major commodities is consistent with the growth rate of imports, that is, about 1 per cent p. a. or slightly less. If this is the case, exports grew probably faster than national income, implying an increase in openness and a growth in specialization. Second, attention will be paid to differential growth rates of exports among commodities in order to get an idea of the nature and pattern of international labour division the German economy was part of. In particular, if manufacture exports grew more rapidly than exports of primary foodstuffs trade growth can be considered as a means to alleviate the effects of declining labour productivity in agriculture by an expansion of non-agricultural sectors producing tradables.

7.1. Linen

Linen constituted an important export commodity far beyond Prussia and the non-Prussian parts of north-western Germany prior to industrialization. A list of manufacture exports of Württemberg

drawn up in 1795 places linen on top with 41.4 per cent of total manufacture exports (Krauter, 1951: 231-5). Qualitative evidence suggests that linen manufacture constituted the most important export industry in other parts of Germany as well, including Saxony and Swabia (Kaufhold, 1986: 124-5, 136-7, 143-6, 154, 161-6, 169-75). Thus, information concerning of linen exports can to some extent serve as a proxy for the evolution of manufacture exports in general. What follows employs material for Silesia and Westphalia to establish the evolution of linen exports over the eighteenth century.

Figure 6. Real exports of linen, 1748-1787, and number of weaving looms in Silesia, 1748-1795



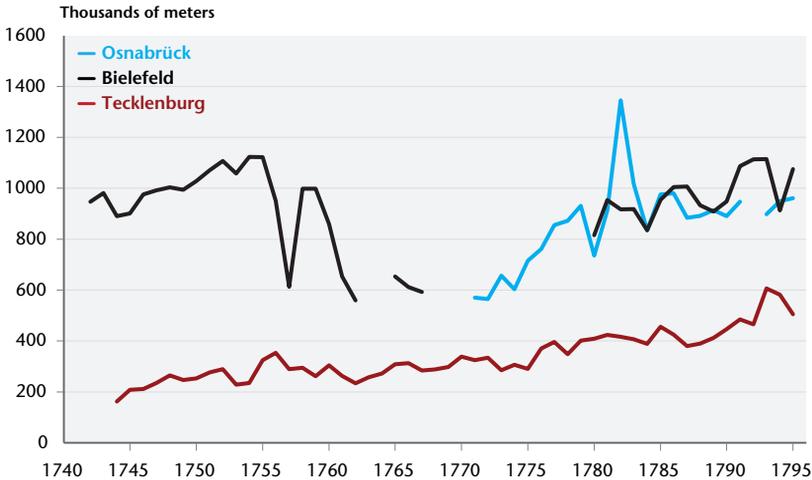
Notes: Zimmermann gives export values in Taler. Exponential trend of export value 0.9 per cent ($R^2=0.13$), of exports deflated by price of Engelberg linen in Hamburg 1.2 per cent ($R^2=0.14$), of exports deflated by synthetic linen price in Hamburg 0.4 per cent ($R^2=0.03$), and of the number of weaving looms 0.8 per cent ($R^2=0.77$).

Sources: Zimmermann (1885: 458, 460-7); price deflators: own calculation on the basis of Commerzbibliothek Hamburg S/49 (Hamburg price current), cf. Pfister (2012: 63-4).

On this background Figure 6 also considers the number of weaving looms used in commercial linen production in the province. Since the overwhelming part of commercial linen production was exported the number of weaving looms can serve as a proxy for export quantities. The eight censuses conducted between

1748 and 1795 follow a trend of 0.8 per cent p. a. The contrast between this figure and export values deflated by Engelsberg linen suggests that over the period under study linen types suffering from a falling relative price were substituted by the manufacture of goods offering higher prices. The growth rate of 0.8 per cent p. a. is the one retained for the subsequent discussion.

Figure 7. Purchases of linen in Westphalian linen markets, 1740s to 1795



Notes: Meter conversion for Osnabrück is based on average length in 1806-1815, for the other two series on length of ell in Bielefeld (0.58652 meters; Verdenhalven, 1993: 16). Exponential trend of purchases in Osnabrück 1.8 per cent ($R^2=0.44$), in Bielefeld 0.0 per cent ($R^2=0.00$), in Tecklenburg 1.6 per cent ($R^2=0.81$).

Sources: Flügel (1993: 281-3); Schlumbohm (1994: 634-6); Küpker (2008: 464-5).

Figure 7 uses the number of pieces recorded in the ledgers of three important linen markets to track the evolution of linen exports from eastern Westphalia. Since linen markets mediated between commercial linen producers and export merchants transaction volumes can serve as proxies of real exports. To render the series roughly comparable information on the length of pieces was used to convert all figures into meters. The picture emerging from the resulting graphs and their trend growth rates (see notes to Figure 7) is again far from uniform: Over the whole period the transaction volume of the Bielefeld market moves flat. In addition, there is a long slump between the onset of the Seven Years' War in 1756 and 1780. To a weaker extent, a similar trajectory occurred in Tecklenburg where the transaction volume recorded in 1756 was

surpassed only in 1776, and it is also visible in the number of weaving looms in Silesia between 1755 and 1780 (Figure 6 above). Note that the timing of this slump is similar to the temporary stagnation of real imports in Hamburg (see above, Figure 4). Nevertheless, over the whole period 1747-1794 the number of pieces purchased in Tecklenburg expanded at an annual rate of 1.6 per cent. Given the trajectory of transaction volumes in Bielefeld and Tecklenburg it is difficult to interpret the graph for Osnabrück, which starts only during the recovery phase of the slump c. 1755-1780. If export production in this region prior to the 1770s followed a trajectory comparable to the one of the Bielefeld market then the estimated trend growth rate of 1.8 per cent is certainly too high.

Information from the Hamburg price current, which listed linen prices from all three Westphalian markets studied here, can be used to estimate export values and to derive a projection of aggregate growth of linen exports from these major linen producing regions. In 1779-1783, which serves as a period of reference, the respective share of the three Westphalian markets in the region's total known linen exports was 47 per cent for Osnabrück, 33 per cent for Bielefeld and 20 per cent for Tecklenburg. The weighted growth rate of transaction volumes is 1.2 per cent. Given the caveats concerning the Osnabrück series this certainly constitutes an upper bound of the pace of the growth of linen exports from eastern Westphalia between the 1740s and the 1790s.

If estimated export values from Westphalian markets are combined with figures for Silesia the weights are nine per cent and 91 per cent, respectively (with 1779-1783 again serving as reference years). According to the synthesis of manufacture exports of Prussia in 1781 the share of Silesia in total linen exports amounted to 86 per cent and the one of the territories in eastern Westphalia to 9 per cent (Behre, 1905: 346). This looks fairly consistent with the information used in the present analysis, but it should be borne in mind, on the one hand, that the Prussian ledger does not include Osnabrück (which constituted an independent prince-bishopric). On the other hand, this study does not cover all relevant markets in the Prussian territories of eastern Westphalia (i. e., Herford). Nevertheless, the overwhelming weight of Silesia in known linen exports implies that this province largely determines any estimate of export growth: If the growth rate of the number of weaving looms is

accepted as the most likely figure for real growth of Silesian linen exports, total growth of linen exports remains 0.8 per cent p. a. independently from whether the growth rate for Westphalia (1.2 per cent) is weighted with 9 per cent or 20 per cent.

The bottom line of this analysis is that the most likely growth rate of real exports of German linen, at least of producer regions from the northern half of the country, was about 0.8 per cent or slightly less than one per cent p. a. between the 1740s and the 1790s. This figure is remarkably similar to the earlier finding concerning the evolution of aggregate imports, which underscores its credibility. The fact that one major export-oriented manufacture sector grew faster than both population and income per capita also implies the presence both of international specialization and of a structural shift from the production of subsistence goods to the production of traded goods. To the extent that it occurred through the mobilization of underutilized labour during the slack seasons of the agricultural year the present findings also point to the operation of an industrious revolution.

7.2. Worsteds from Calw

As the Prussian export structure in 1795 showed, woollens and worsteds can be considered as the second most important type of traded textiles in eighteenth century Germany after linen. The classic study of Troeltsch (1897) on the monopoly trading company in worsteds of Calw provides a glimpse of the export dynamic of this sector. While exports of woollens and worsteds valued less than those of linens in Württemberg's manufacture exports in 1795 (Krauter, 1951: 231-2) information concerning the activity of the company of Calw constitutes one of the few pieces of systematic evidence on the evolution of cross-border trade in south-western Germany. An investigation of worsteds exports from the region of Calw thus provides an important complement to the analysis of linen exports from regions situated in the northern half of Germany.

The worsted trading company possessed the monopoly to purchase and market worsteds in an important section of the Black Forest in western Württemberg (for a modern study of the industry, see Ogilvie, 1997). Many workers resented this monopoly because it depressed their revenue. Interloping was always a

problem, therefore, and the (probably not too unrealistic) assumption underlying the following discussion is that production and sales abroad circumventing the company did not grow faster than the market segment controlled by the company. Between the 1710s and the 1770s domestic sales were usually below five per cent of total company sales; fully 50 to 70 per cent of revenues were generated through the fairs of Bolzano, an important point of entry to the Italian market. Visits to the fairs of Frankfurt and Zurzach – still a relevant gateway to the Swiss market – provided a further ten per cent of revenues. Finally, about a quarter of all sales were conducted with agents or individual clients (Troeltsch, 1897: 181-2, 185, 188). The high proportion of sales generated through fairs characterizes the business practices of the company as rather old-fashioned.

Figure 8. Activity of the worsted trading company of Calw, 1680-1778



Notes: Recorded sales values in 1695-1700 were augmented by 25 per cent to compensate for underregistration (Troeltsch, 1897: 180). Exponential trend of sales value from 1711 0.7 per cent ($R^2=0.54$), of pieces of worsteds purchased 0.8 per cent ($R^2=0.70$).

Source: Troeltsch (1897: 157-8, 175, 179-80, 185, 187).

Troeltsch gives numbers of pieces purchased by the company from weavers as well as purchase and sales values for various years between 1680 (rough estimate) and 1778. Figure 8 shows the first and the third variable. From 1711 sales values increased with a trend growth rate of 0.7. The wars of Louis XIV, particularly the War of the League of Augsburg (1688-1697), when south-western

Germany was a theatre of war, depressed activity in Württemberg's worsted sector: Values of sales were particularly low in 1695 and continued to be below average during the remainder of the decade. Part of the export growth visible in the early eighteenth century may have resulted from post-war reconstruction of production and market networks. The trend fitted on the sales values from 1711 underestimates the value in 1680 by about 12 per cent, which indicates that the true trend growth rate over the entire period 1680-1780 may have been a bit lower than 0.7 per cent.

To be sure, growth was uneven across sub-periods. Reconstruction after the end of the wars of Louis XIV passed into sustained export growth until the Seven Years' War; the growth rate of sales values in the five decades from 1711 to 1761 was 1.3 per cent, whereas a declining trend set in after 1761. The parallel fall of Italian GDP in the decade or so following 1762 (Malanima, 2011: 187) indicates that demand failure in a major export market may explain part of the trajectory of the worsted industry in Calw.

There are no prices of worsteds that could serve as deflator for sales. Nevertheless, the ratio of purchase value to the number of pieces purchased stays essentially flat between 1711 and 1778, suggesting stability of prices. Furthermore, information concerning the number of pieces of worsteds purchased by the company from weavers, which covers fewer years than sales values but begins in 1705 already, shows a similar trajectory and almost the same long-term trend as the latter, namely, 0.8 per cent. Thus, the conclusions reached at the end of the preceding section concerning linen exports from major regions situated in the northern half of Germany can be generalized for a wider set of textile industries and regions.

7.3. Grain

Section 6 ended with the conjecture that in c. 1790-1830 Germany must have experienced a shift of the commodity composition of its exports from semi-finished industrial goods and manufactures to raw materials. The final part of the analysis attempts to shed more light on the pattern and timing of this transition.

On the one hand, sketchy evidence suggests that textile exports found it difficult to recover from the dislocation suffered during the Napoleonic Wars. In 1815 almost half of the yarn processed by German cotton manufacturers was imported, and the degree of self-sufficiency declined further to a level between a quarter to a third during the 1820s and 1830s (Kirchhain, 1973: 29-30). Given that cotton goods partly substituted linen and since German producers were hesitant regarding the industrialization of linen manufacture this branch entered into decline. Suffice here to say that three Westphalian series underlying Figure 7 above show stagnant or lower levels of linen purchases by export merchants in the 1820s compared to the early 1790s; by 1819 the number of weaving looms in Silesia had fallen to the level prevailing in the 1770s.

On the other hand, there is evidence of an increase in grain exports that reaches back into the second half of the eighteenth century. Although regional grain markets were highly fragmented before the age of railway construction it is safe to say that grain imports were of little importance during the eighteenth and early nineteenth century. The only notable exception appears to be Saxony, which imported grain from Bohemia. Quantitative evidence regarding the magnitude of this trade begins to come forward only in the second half of the 1830s, however (Kiesewetter, 2007: 257-60). Two regions are known to have specialized in grain exports. The principal one concerns the southern Baltic and adjacent areas on the shore of the North Sea (Holstein) that exported grain to the Netherlands and increasingly to Britain. Note that the regions east of Pomerania did not belong to the Holy Roman Empire and in their majority formed part of Poland until the divisions of this country in 1772-1795. The smaller grain exporting regions is located in the south and concerns fertile basins specializing in grain exports to nearby northern Switzerland. What follows discusses in turn evidence regarding the extent of export growth in these two regions.

Since the rise of the urban economy in Holland at the beginning of the modern era the southern Baltic played an eminent role in provisioning the population of Dutch towns with grain. If Baltic grain trade stagnated after the middle of the seventeenth century it gained new momentum from the middle of the eighteenth century. To some extent this was due to the fact that industrializa-

tion and population growth turned Britain from an exporter to an importer of grain (von Tielhof, 2002: 40-66; Ormrod, 2003: 209-217). In order to track the implications of this development for Germany's external trade Figure 10 combines information on British wheat imports from Germany in 1800-1833, grain and wheat exports of Gdansk in 1751/1815-1850, Prussian wheat exports in 1822-1850 and grain exports of Hamburg until 1844. However, information for the latter is confined to decennial averages from 1753-1762 to 1823-1832.

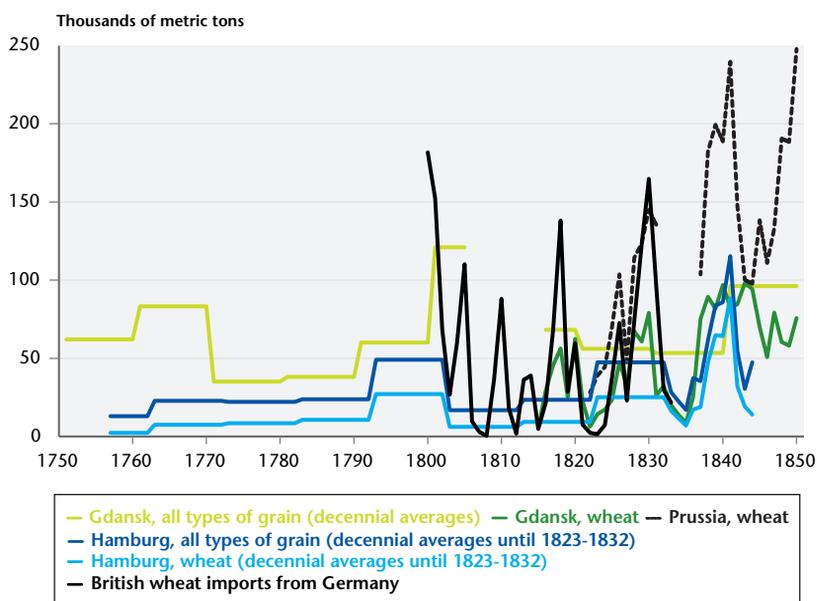
Grain exports of Gdansk reached sizeable quantities already by the 1760s, and there was little growth until the 1840s. In addition, however, Hamburg emerged as a major grain exporter after the Seven Years' War, which implies that commercial production in the south-western Baltic increased – Hamburg handled mostly trade with grain from Mecklenburg and Holstein. If one disregards the fact that data for Hamburg concern ten year averages before 1833 and fits an exponential trend one obtains an annual growth rate of 1.2 per cent (with growth in the eighteenth century probably being stronger than over the whole period). This rate of increase exceeds the one observed earlier for manufacture exports.

To be sure, export growth was uneven and characterized by strong fluctuations in the short run. In the long run the expansion of Hamburg's grain exports took place in two waves. The first occurred during the last third of the eighteenth century. The Napoleonic Wars and the Corn Laws enacted in 1815 led to a temporary slump in German exports, but strong demand in Britain and gradual liberalization led to renewed export growth from the second half of the 18120s onwards. Harvest failures such as those in 1817, 1830 and 1840 were associated with short-run peaks in German grain exports. This suggests a role for demand failure in international grain trade (Sen, 1981): The growth of non-agricultural income relative to non-agricultural incomes on the continent in the wake of the British industrial revolution meant that during a food crisis British consumers were capable to exert an international demand for foodstuffs so that grain exports elsewhere increased despite meagre harvests.

Demand for grain exports from south-western Germany was strongly influenced by developments in northern Switzerland. The hilly parts of this area were not self-sufficient in grain at least peri-

odically already by the Late Middle Ages, and proto-industrial development during the early modern period rendered these regions structurally dependent on grain imports from fertile areas situated to the north of the Rhine. Partly since these export regions were not contiguous, trade was highly fragmented, but the small port of Überlingen situated on Lake Constance seems to have handled a major part of Swabian grain exports to north-eastern Switzerland. By the eighteenth century the transaction volume of its market appears to have been on par with major other major grain markets between the Vosges and Bavaria, namely, Strasbourg and Ulm (Göttmann, 1991: 231-235; Brandenberger, 2004: 182-310).

Figure 9. Grain exports of northern Germany, 1753-1850



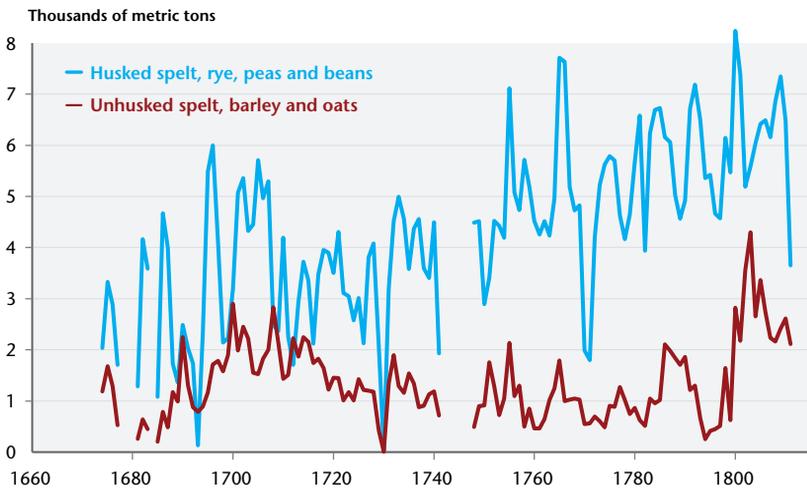
Notes: English prices given by Kutz assumed to refer to quarters; specific weight of both wheat and grain in general assumed to be 0.66.

Sources: Soetbeer (1846: 162); Kutz (1974: 276, 287-288); Bass (1991: 320); van Tielhof (2002: 63); wheat price in London 1827-1833 and British conversion ratios from Allen (2001); conversion ratios for Germany from Verdenhalven (1993).

Sales of grain in Überlingen were undertaken in view of exports across Lake Constance, so that the transaction volume can be interpreted as a proxy of exports. Figure 10 shows the transaction volume of two groups of grain types. The first comprises so-called heavy grains, that is, mostly spelt (the principal grain in south-

western Germany) and rye, in metric tons. What follows focuses on this group, because trade with the second group – so-called light grains, consisting of unhusked spelt, barley and oats – was of smaller importance and shows no trend. Since contemporaries measured grain by volume, not by weight, the conversion to modern weight units must make speculative assumptions about the specific weight of traded grain in those days. Assuming a uniform specific weight across different types of grain, as in Figures 9 and 10, at least preserves volume relatives between contemporary figures.

Figure 10. Volume of grain sales in the market of Überlingen, 1674-1811



Note: Data refer to crop years starting in August. Density is assumed to be 0.66. Exponential trend of turnover of husked spelt, rye spelt peas and beans is 0.8 per cent ($R^2=0.23$), after removal of minima in 1693, 1730 and 1770/1 0.7 per cent ($R^2=0.47$); for the sub-period 1750-1791 (1770/71 removed) the exponential trend is also 0.7 per cent ($R^2=0.19$). Transaction volume of unhusked spelt, barley and oats is trendless (slope of exponential trend 0.1 per cent p. a., $R^2=0.00$).

Source: Göttmann (1991: 422-5, 485).

Even if grain exports in southern Germany were probably less concentrated on major markets grain their volume remained much smaller than the one of grain trade across the Baltic and the North Sea. British wheat imports from Germany around 1800 exceeded the turnover of Überlingen by a factor of more than 20, and already by 1763-1772 Hamburg handled grain exports that were four times larger than those flowing through Überlingen.

Depending on the specification chosen the transaction volume of spelt, rye and legumes at the market of Überlingen increased at

an annual rate of 0.7 to 0.8 per cent over longer periods between the late seventeenth century and c. 1800 (see note to Figure 10). The conclusion that emerges is that grain exports grew faster than population and not slower than exports of linen from northern Germany and worsteds from Calw.

Taken together, the findings concerning the evolution of grain exports from northern and southern Germany suggest that specialization on non-agricultural products failed to develop over the eighteenth and early nineteenth centuries, despite a notable decline of the employment share of agriculture (Pfister 2011: 5). During the second half of the eighteenth century the commodity composition of exports probably remained roughly stable with respect to major categories of products and seems to have shifted towards raw materials in the early nineteenth century. Population growth was not only associated with an expansion of the non-agricultural sectors of the economy but also contributed to an intensification of arable farming whose output was increasingly used to feed the growing non-agricultural populations in other countries experiencing faster industrialization and growth of non-agricultural income.

8. Conclusion

Three findings emerge from this study. First, international trade of Germany expanded at an annual rate of 1 per cent or slightly less in real terms between the 1730s and the early 1790s. This rate appears modest but is nevertheless remarkable. Per capita income probably remained more or less stable during this period so that aggregate income moved in parallel with population. Population in turn expanded at an annual rate of about a half per cent. The fact that international trade grew faster, albeit by a modest margin, than national income implies an increase in openness. This process unfolded over more than half a century before Germany's transition to sustained growth around 1820 Pfister *et al.* (2012), which provides strong support for the idea that Smithian growth constitutes an important precondition for modern economic growth by shifting factors to more efficient use, by rendering it possible to move along learning curves and by creating scale effects with respect to the application of technological innovations.

Second, the movement of principal categories of merchandise informs us about the nature of the gradual increase in openness. Simple manufactures and semi-finished industrial goods dominated Germany's exports at the end of the eighteenth century. Linen came first, followed by woollens and worsteds, cottons and iron goods. The rapid increase of the weight of cotton goods in Germany's exports over the final decades of the eighteenth century, which partly compensated for the relatively modest growth of linen exports, sheds new light on the early development of a future industrial leading sector that calls for in-depth research. Growth of manufacture exports should be considered in the context of the parallel fall of day wages of unskilled urban labourers (Pfister, 2014): Expansion of the production of tradables by means of an increasing work effort per capita – which includes work during the slack seasons of the agricultural year as well as the mobilisation of the labour capacity of women and children – constituted a means to compensate for the effect of a rapidly falling marginal product of labour in the sectors producing non-tradables on material welfare. Export growth of manufactures thus resolves the contradiction between falling day wages and stagnant per capita income.

On the import side the period between the 1730s and the 1790s saw a rapid shift of the commodity composition of trade towards colonial goods, mostly sugar and coffee. Growth of these imports approached an annual rate of 2 per cent in real terms, which roughly corresponds to the long-term rate of increase of cross-Atlantic trade during the early modern period. Even if it had no direct access to colonies in the Western Hemisphere before American Independence Germany was intimately linked to the eighteenth-century boom of the Atlantic economy. The strong increase of imports of colonial goods was partly compensated, on the one hand, by a fall of imports of manufactures, in particular of cottons, at least until c. 1780. Since imports of inputs required for cotton manufacture expanded, the decline of manufacture imports was essentially due to import substitution through an increase of the labour effort outside agriculture, which also underlay export growth of manufactures. On the other hand, rising imports of colonial goods partly substituted for declining imports of wine and Mediterranean groceries such as currants and raisins whose price

rose relative to both non-tradables and colonial goods. To some extent the shift of consumer demand to colonial goods followed changes in relative prices.

How do these shifts in the commodity composition of trade relate to the Industrious Revolution and Divergences these evoked in the introduction to this study? The inference that an expanded production of manufactures for export compensated for a declining day wage of unskilled labourers certainly involves an increase of the work effort per capita. In the strict sense of the term, however, the Industrious Revolution refers to a shift of household preferences implying the readiness to increase the work effort at a given wage. It is problematic to stretch the results of this study beyond the statement that the expansion of the work effort in sectors producing tradables contributed to a compensation of the negative welfare effects of a falling marginal product of labour in the non-tradables sector. In other words, people worked more to cope with need, rather than to increase consumption.

A similar statement can be made with respect to the interpretation of import growth with respect to colonial goods, most importantly coffee. Among the small affluent segment of society the consumption of coffee (and tea), in combination with the purchase of porcelain and earthenware, certainly constituted part of an emerging consumer culture. Among the working class, however, coffee constituted a workplace drug that made it easier to endure long hours of monotonous work demanding little physical force but considerable concentration with meagre caloric intake. Thus, import growth of colonial groceries was fuelled by the emergence of an industrial working class diet, which in turn reflects the rising trend of manufacture exports.

The prominence of commodities originating in the western hemisphere in eighteenth-century German imports points to the possible role of American resources for European economic growth stressed by the Great Divergence thesis. Support for this thesis is limited to Mediterranean groceries and beverages, which were consumed by the affluent segments of German society rather than the population at large. The relative prices of these goods rose, and cross-price elasticities of demand suggest that Mediterranean and colonial goods tended to be substitutes. As prices of colonial goods rose relative to the domestic price level it is difficult to argue that

rising imports of the former relieved land scarcity in Germany proper. In addition, absolute import quantities of sugar and rice were too small to make a relevant contribution to everyday diet in caloric terms. Only to the extent that coffee originating in the Antilles was an important element in the diet of the emerging industrial lower classes do American resources matter in German economic development.

The third and final conclusion refers to the commodity composition of exports and the evolution of trade in general during the early part of the nineteenth century. Whereas manufactures dominated exports around 1790 primary commodities were relevant as well. Moreover it does not appear that exports of manufactures grew faster than those of grain and wood during the preceding half-century. In other words, specialization between sectors did not increase, at least during the latter part of the eighteenth century. This also implies that the capacity of export-oriented manufacture production to absorb population growth was limited. The declining land-labour ratio also contributed to an intensification of arable farming, which in turn led to an expansion of commercial grain production. Foodstuff exports went to Great Britain and to a much smaller extent to Switzerland. These were countries with relatively faster growth of industry and non-agricultural incomes compared to Germany.

The unfolding of the British industrial revolution exacerbated the effect of differential industrial growth between Germany and her trading partners on export structure in the four decades c. 1790-1830. External trade probably did not grow faster during this period than during the half-century before, and openness seems to have increased slower. This appears to have been the consequence of a decline of manufacture exports in the face of British competition. By 1830 primary commodities dominated German exports. Moreover, short-term fluctuations of grain exports followed harvest failures, with grain exports from German lands peaking in times of harvest failures. This suggests a considerable importance of demand failure in explaining the time pattern of grain exports: British consumers disposing of non-agricultural incomes found it easier to demand basic foodstuffs than rural households in the agrarian parts of the continent. Thus, grain trade may have worsened suffering in export-oriented agrarian regions during harvest

failures. The adverse conditions prevailing on international markets for manufactures and the limited gains resulting from foodstuff exports underscore the importance of internal market creation epitomized by the formation of the *Zollverein* in 1834 for German economic development during the first half of the nineteenth century.

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