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Historical Price Indices and Price Shocks: Norway 1736–1766

A Macroeconomic and Historical Approach

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Abstract

In this paper, we use the Laspeyres index to construct a cost of living index (CLI), a wholesale price index (WPI), and a producer price index (PPI) for Norway for the period 1736–1766. We use the newly published database *Historiske toll- og skipsanløpslister* to collect price series on Arendal, Christiania, Drammen, Fredrikstad, and Kristiansand. Our final data set, after necessary refinements and interpolations, consists of price series for 52 commodities. Due to the importance of the cities in this context, the resulting indices are representative for the country as a whole. After constructing the indices, we analyze them using historical findings and economic theory. We use the CLI to analyze the general price level and calculate inflation. From the CLI we identified four major price shocks. The main findings from the analysis is that crop failure and wars have the most substantial impact on national price levels. Towards the end of the period, we find that increased money supply to finance wars caused persistent inflation in the long run.

We also analyze the PPI, where we find that substitution effects, regulatory changes, and supply changes are the most important causes of price shocks. Although it is difficult to postulate causal effects between the shocks and historical events, the findings of this thesis still point towards explicit relationships between the events and timing of the price shocks. We believe the revised CLI is more reliable and accurate than Grytten (2004), since the data set used in this thesis is more extensive and accurate. When comparing our CLI with Sweden and Denmark, we find that it reflects historical events better than Grytten (2004), because our index follows the general price development in Scandinavia better and therefore captures the effects of exogenous economic shocks more reliably. We also confirm that erratic inflation was not an uncommon phenomenon for the period, which is in line with previous literature on the topic.

Acknowledgements

This master thesis in Economics concludes our five-year degree in Economics and Business Administration at the Norwegian School of Economics. The workload of this thesis is 30 ECTS.

We would like to thank our supervisor, Professor Ola Grytten, for accurate and helpful guidance throughout the process, especially concerning the construction of the price indices. We have also shared interesting discussions on economic history, and he always provided us with constructive feedback. It has been a great opportunity and pleasure to be able to learn how to construct price indices, as it has left us with a greater understanding of Norwegian economic history. These past months have been quite educational, as they have given us new expertise in this method and academic field.

This thesis could not have been completed without the preliminary work of Historisk infrastruktur, the team behind the database Historiske toll- og skipsanløpslister. We would like to thank the team for their work regarding transcribing and publishing price data for the 16th–18th centuries, as it made it possible for us to use the data to construct indices for the 18th century. The database contributes to greater knowledge and understanding of the economic and social conditions in Norway during that time, concerning national and international trade, and we hope our results are useful in their future work and research.

We would also like to thank Christian Braathen for his voluntary guidance in LaTeX. Thanks to his continuous support, we became comfortable and independent users of the system, which made the process of writing the thesis smooth and efficient. Lastly, we would like to thank our friends for constructive feedback and proof-reading.

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1 Introduction

Historical price indices are commonly used to measure price levels and inflation. Calculating inflation has several uses, of which measuring the cost-of-living in a country is the most common. In this thesis, we construct revised price indices—normalized weighted averages of prices over time—in order to bring new insight to the Norwegian economic history. New data, published as recently as 2017 by Historisk infrastruktur, makes it possible to construct new indices. A cost of living index has previously been made by Grytten (2004), albeit with limited data.

We construct three historical price indices—a wholesale price index (WPI), a cost of living index (CLI) and a producer price index (PPI)—using price observations from five south-eastern and southern cities in Norway for the period 1736–1766. We use the following cities: Arendal, Kristiansand, Christiania (modern-day Oslo), Drammen, and Fredrikstad. The location and importance of these cities during the 18th century allow for the results to be representative for Norway as a whole.

The WPI can be used to give a holistic image of the price developments during the time period. The CLI consists commodities that were essential in daily consumption of an average household and will be useful in understanding price shocks. The CLI is used to calculate yearly inflation rates, which in turn can be used to identify and analyze price shocks. Lastly, the PPI consists of the fish and wood industries, which played a central roles in the nationwide economy, and can shed light on the industry development in the south-eastern coastal region.

1.1 Purpose of Thesis

The purpose of this thesis is to use the Laspeyres index to construct three price indices, as well as analyze them using both economic theory and 18th century Norwegian economic history. We will use our findings to shed new light on these price developments at a much more detailed level than most of the previous literature, which focuses either on constructing indices or on analyzing them and not both. Therefore, we believe that our thesis can be valuable for historians, economists, and the Norwegian central bank.

1.2 Structure

The thesis is structured as follows. In Chapter 2, we present the state of the art, and show how our thesis can contribute to the previous literature. Then, in Chapter 3, we give an account of relevant 18th century Norwegian history. Chapter 4 elaborates on relevant economic theory. In Chapter 5, we present and discuss data that underpins the thesis. We explain how we use the Laspeyres index to construct our indices in Chapter 6. The final indices, as well as the inflation rate for the period, are presented in Chapter 7. In Chapter 8, we incorporate key findings from the chapters on previous literature, history, and economic theory, to analyze and explain price shocks in the CLI. We also compare our findings to Grytten (2004), and with indices for Denmark (Abildgren, 2009) and Sweden (Edvinsson & Söderberg, 2011), to better understand the general development in the time period, and whether our index better reflects shocks than Grytten's. Chapter 9 concludes the thesis. The three indices are tabulated at the commodity, group, and aggregate level in the Appendices. The indices by Grytten (2004), Abildgren (2006) and Edvinsson & Söderberg (2010) are also included there.

1.3 Terminology

There are several key terms that we frequently use in this thesis. Here, we define the most central ones.

Wholesale Price Index (WPI): A weighted index that measures changes in the prices paid for commodities at various stages of distribution up to the point of retail. The commodities are usually valued at purchasers' prices (Organization for Cooperation and Development, 2005).

Cost of Living Index (CLI): A weighted index that measures the cost of living for an average working-class household. A CLI typically includes consumable commodities and other basic necessities for survival, such as food and firewood. It differs from a consumer price index (CPI), which is more extensive and measures a weighted value of a market basket of commodities, often covering additional sectors and services, such as real estate, gas, and electricity. Our data set does not include price series on such services.

Producer Price Index (PPI): A weighted index that measures the price developments of domestically produced commodities that are exported domestically and abroad (Statistics Norway, n.d.). In this thesis, we use the PPI to measure the price development for the fishing industry and the wood industry, since these sectors played a central role in the Norwegian economy in the studied period.

Inflation: A sustained increase in the general price level. In this thesis, it is found by taking the percentage change in the annual CLI.

Deflation: A sustained decrease in the general price level. Computed the same way as inflation.

Demographic crisis: A sudden and extreme increase in a nation's mortality rate, usually a rate that is twice as high as normal (Herstad, 2000, p. 247). A demographic crisis can be classified as an epidemic or a nutritional crisis (Dyrvik, 1983, p. 163).

Price Shock: In the short run, we refer to price shocks as exogenous shocks in the Aggregate Supply-Aggregate Demand model that lead to either an increase or decrease in the inflation rate. In the long run, price shocks are caused by an expansion of the money supply.

Mercantilism: National economic policy from the 15th to 18th century that aimed to increase a state's wealth and power, often through a trade surplus (Moseng, Opsahl, Pettersen, & Sandmo, 2003, p. 335).

2 State of the Art

This section presents previous literature on Norwegian historical cost of living indices (CLIs), in order to better understand the contribution of this thesis to previous work. We also present historical price indices from Denmark and Sweden, as we will use them in the analysis in Chapter 8.

2.1 Historical CLIs from Norway

Statistics Norway (Statistisk Sentralbyrå, or SSB) reports monthly and yearly national inflation, but the oldest complete consumer price index (CPI) published by SSB only dates back to 1865. Grytten (2004) has computed price indices for Norway for the period 1516–2003. His paper is part of a larger project initiated by the Statistics department of the Norwegian central bank (Norges Bank), a publication called *Historical Monetary Statistics* (Eitrheim, Klovland, & Qvigstad, 2004). Therefore, the historical CLI by Grytten (2004) is more extensive and far more relevant for this thesis, than the CPI provided by Statistics Norway.

Grytten (2004) constructs a cost of living index spanning five centuries and breaks them up into different periods. For the period 1666–1819, data is primarily taken from merchant accounts from the central Norwegian market place, known as *Bryggen i Bergen*, and partly from price currents, which reported prices on traded commodities between the northern parts of Norway and Bergen (Grytten, 2004, p. 55). Furthermore, some price observations are extracted from Coldevin's work (1938, as cited in Grytten, 2004, p. 55) on prices in northern Norway in the 18th century, and some from the City Archive of Bergen.

There are certain limitations regarding the scope of the data used in Grytten (2004). First of all, although Grytten presents his work as a CPI, it is important to note that the resulting index is actually a CLI. This is quite clear, as the data he uses is limited to a maximum of 21 commodities for the entire period 1666–1819, all of which are essential in calculating the cost of living for a working-class family (Grytten, 2004, p. 53–55). Specifically for the period 1709–1819, Grytten computes a CLI for a basket of 18 commodities, including grains, vegetables, beverages, colonial commodities, manufacturing commodities, fish, foodstuffs, and skins. These are necessity commodities, rather than an average basket of commodities that also includes services, which Grytten's data set does not include.

In terms of raw data, the biggest drawback is that price data before 1819 is reported only once or twice a year (Grytten, 2004, p. 56). Moreover, the construction of the CLI for the period 1516–1819 is computed through splicing, whereby CLIs from 1871 onward are spliced with the price indices from 1516–1819. The same is done for the period 1819–1871. This was done because it was not possible to construct a CLI for the period before 1819 with the same validity and reliability as for the period 1819 onward. Figure 2.1 shows the index constructed by Grytten. The price indices are retrieved directly from the Norwegian central bank's website, where they have published a spreadsheet of Grytten's indices covering the period 1516–2003 (Norges Bank, 2006). The average annual inflation for the period 1736–1766 is 2.76%.

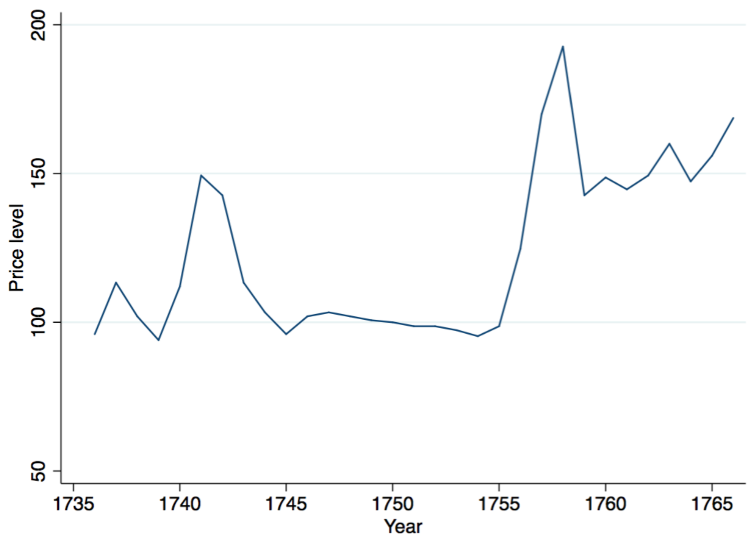

Figure 2.1: Cost of Living Index for Norway, 1736–1766, 1750=100 (Norges Bank, 2006; Grytten, 2004)

We would also like to mention Klovland (2013) and his contributions to the literature, particularly monthly price indices for the period 1777–1920. He has also written comprehensive papers on historical stock price indices from 1914 to 2003, and historical monetary statistics in the period 1819–2003. Lastly, we would like to mention Qvigstad (2005) and his work on explaining major abnormalities in price stability from 1516 to 2003. His work is relatively concise, since he does not go into detail about just one period, but uses Grytten's CLI to analyze the price developments in Norway over the past 500 years. He finds that during the 1600s and 1700s, price levels were relatively stable, with annual inflation around 2% (Qvigstad, 2005, p. 4). He then identifies six major periods in Norwegian history that clearly deviate from relatively normal price trends. To explain these price shocks, Qvigstad draws links between temperature and inflation, as well as major wars, such as the Seven Years' War, the Napoleonic War, and the World Wars. His work is useful in understanding which factors trigger sudden price shocks, and why some shocks revert prices back to a normal, while others cause a long-run shift in the general price level.

2.2 Historical CLIs from Sweden

Similar work on historical cost of living indices has also been done for Sweden and Denmark and published by their respective central banks. We got the indices for both Sweden and Denmark from the Danish central bank's website (Danmarks Nationalbank, 2009). Edvinsson & Söderberg (2011) present Sweden's CPI from 1290 to 2008. However, the index can only be considered a CPI in the years after 1914. Before that, the index is a CLI. This is because prices before 1914 include wholesale prices, and do not include urban or industrial districts, which would likely result in higher price level (Edvinsson & Söderberg, 2011, p. 274).

For the period 1732–1913, Edvinsson & Söderberg draw on data and the CLI from Jörberg (1972). Jörberg's work is based on market price scales that determined official prices for commodities, and were set once or twice a year (Edvinsson & Söderberg, 2011, p. 272). Although market price scales did not fully record price fluctuations, this form of price measurement is believed to represent the valuation of commodities (Jörberg, 1972, p. 8–31, as cited in Edvinsson & Söderberg, 2011, p. 273).

Edvinsson & Söderberg (2011, p. 289) find that consumption patterns in Sweden were relatively constant until 1850, mostly due to stagnant real wages. By comparing the indices from the different centuries, they find that the 16th, 18th and 20th centuries had notably high levels of inflation. High inflation from the 18th century is largely explained by the implementation and excessive use of the fiat standard, a currency system based on inconvertible money, and not backed up by a physical commodity (Edvinsson & Söderberg, 2011, p. 285).

Figure 2.2 shows the price index for Sweden. The average inflation for the period 1736–1766 was 3.71%, which is 1.3 times higher than the inflation rate found by Grytten (2004) for Norway during the same period. There is a distinct positive trend throughout the period.

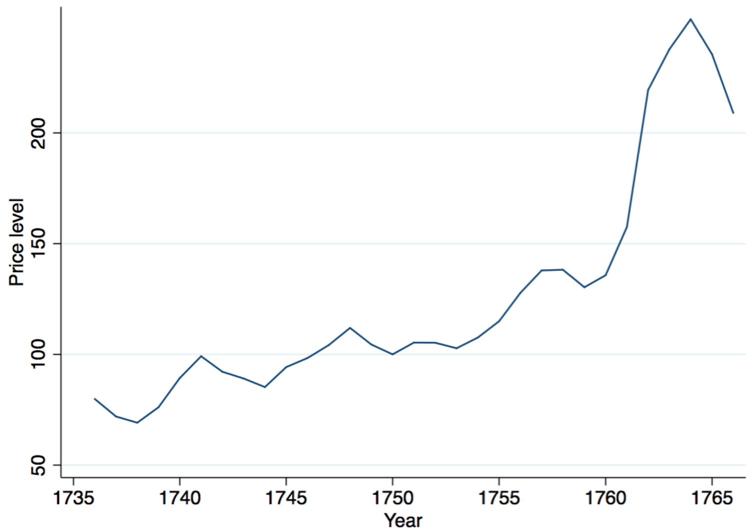

Figure 2.2: Consumer Price Index for Sweden, 1736–1766, 1750=100 (Edvinsson & Söderberg, 2011; Danmarks Nationalbank, 2009)

2.3 Historial CLIs from Denmark

Abildgren (2010) constructs a CPI for Denmark for the period 1502–2007. In his work, Abildgren constructs new indices for the period before 1815, by using data from the Danish Price History Project, which was completed in 2004. The project contains two comprehensive studies: Andersen & Pedersen (2004) and Friis & Glamann (1958). The former is based on accounting records from 19 rural Danish estates, and the prices are market prices from transactions, whereas the latter source is official prices on of bread and meat in Copenhagen in the period 1684–1800 (Abildgren, 2010, p. 9–10).

Abildgren states that during the period 1712–1800, transport, services, durable commodities, and rent are excluded from the indices, implying that his resulting index is closer to a CLI than a CPI (Abildgren, 2010, p. 11). He states that price stability has persisted in the Danish economy, where price stability is defined as an inflation rate of 2% or lower per annum (Abildgren, 2010, p. 16–17). For the entire period of 1502–2007, Abildgren (2010, p. 20) finds that Denmark had a stable rate of inflation of around 1.8% per year on average.

Figure 2.3 shows Abildgren's (2010) index. He states that annual average inflation in Denmark during the period 1737–1807 was 1.4%, and slightly higher for the period 1736–1766, at 1.67% per annum. This level is lower than Norway, and almost half of the level of inflation in Sweden during the same period. Abildgren underlines that these low rates do not necessarily imply a stable long-run increase in price levels, but rather reflects periods with price stability, other periods with deflation, and some periods with stronger and more sustained inflation. We see this in all three countries.

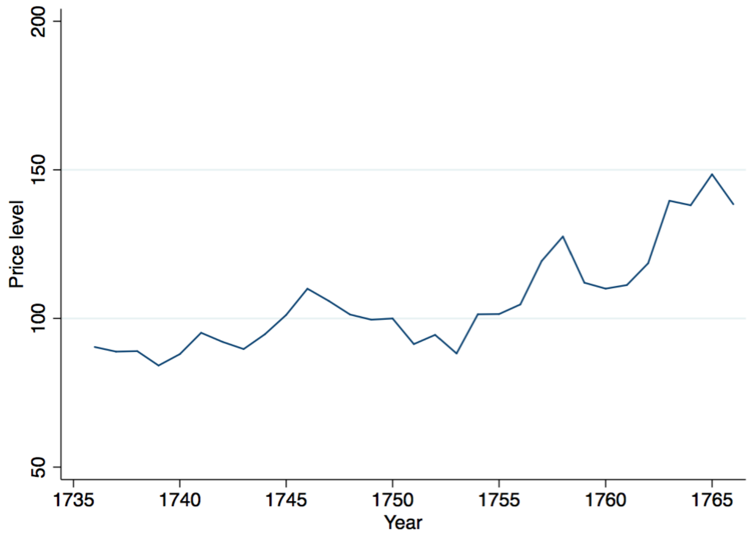

Figure 2.3: Price Index for Denmark 1736–1766, 1750=100 (Abildgren, 2010; Danmarks Nationalbank, 2009)

2.4 Contribution

The main contribution of this thesis is to construct new and more reliable indices for the time period 1736–1766. This is made possible due to the availability of new data, which provides prices for a larger amount of commodities, enabling us to compute an even more accurate index than Grytten (2004). Furthermore, indices based on five cities from the south and east coast have not been constructed before. We believe their inclusion can help illustrate price developments for the entire country. The new indices will complement existing knowledge of Norway's economic situation during the period. We also aim to provide new insight into Norway's economic history, by showing how various events—such as crop failure, policy changes, and war—had a significant impact on the economy. Using economic theory, we provide a detailed analysis where we explain how these events impacted on price levels and caused price shocks. We will also use the findings about Denmark and Sweden to illustrate general trends for price levels in Scandinavia. Events that affected one country often affected the others as well. Sometimes there would be spill-over effects, as when Sweden's active participation in the Seven Years' War affected both Denmark and Norway, even though both these two countries played more passive roles. Therefore, Swedish and Danish economic history can be used to further understand Norwegian history.

3 18th Century Norwegian History

In this chapter, we discuss relevant Norwegian history in the period 1720–1770, to give an understanding of the Norwegian economy, as well as the key developments and changes it faced. Our primary intent is to present conditions and events that we will show affected the prices level and important industries.

3.1 Overview

Norway was under Denmark's rule during the period 1537 to 1814. This union, known as Denmark-Norway, was governed from Copenhagen. Although hard to estimate precisely, Dyrvik (1999, p. 89) states that the population of Norway was somewhat above 500,000 inhabitants in 1701, and approximately 723,000 in 1769. During the 1700s, the Norwegian economy grew closer to Danish levels (Njåstad, 2011, p. 162). This can be explained by the fact that Denmark aimed to increase centralization of the union, to ensure greater autonomy for the kingdom and decrease dominance from Britain, France, and the Netherlands (Dyrvik, 2011, p. 197–198). Increased centralization also reflected that the union's economic policies were largely driven by mercantilism (Dyrvik, 2011, p. 197–198). After mercantilism came to an end in the 1750s, it was slowly replaced by liberalization, though this did not truly take hold until the 1780s (Dyrvik, 1999, p. 229).

Norway was divided into four regional centers, called *stiftamts*: Trondheim, Bergen, Akershus, and Kristiansand (Herstad, 2000, p. 242). The five cities we focus on in thesis were located in the Akershus and Kristiansand region, together known as Sønnafjelske. Bergen, Trondheim, Christiania, Drammen were the largest cities in Norway during the 18th century (Njåstad, 2011, p. 195).

3.2 The Economy

Norway entered a period of peace after the Nordic war (1700–1721) (Sogner, 1999, p. 111). This did not mean the economic and political situations were without tension; the period 1740–1770 was especially difficult for the union as a whole. Nonetheless, both the population and economic activity of Denmark-Norway grew significantly during the 18th century (Dyrvik, 2011, p. 190). The increased economic activity reflected a closer economic integration of essential sectors that increased employment, yet also led to greater inequality (Njåstad, 2011, p. 162).

The currency used in the 18th century Scandinavia was the *riksdaler*. It was made from 28 grams of silver and was divided into 96 schillings, which were measured in a 12-digit system (Johannessen, 2015). In the 1720s, the national income of Norway was approximately 500,000 riksdaler. This increased to one million in the 1760s (Sogner, 1996, p. 111). Respectively, these numbers are equivalent to NOK 1.8 billion and NOK 3.7 billion in 2017's currency level (Norges Bank, 2014).

The first modern bank in Denmark–Norway, *Kurantbanken*, was established in 1736, (Dyrvik, 2011, p. 214). The bank was located in Copenhagen. In the beginning, it was privately owned, providing short-term loans to the private sector (Qvigstad, 2005, p. 18–19). From 1757 and onward, the bank started printing bank notes more actively. It gradually became an instrument for financing state debt, which expanded in times of war, especially in the middle and end of the 18th century (Qvigstad, 2005, p. 19).

3.3 Major Industries

Norwegians' livelihood depended mostly on agriculture and farming, especially harvesting grains and groats (Tranberg, 1997, p. 107; Sogner, 1999, p. 128). Concerning emerging export industries, fish and wood became increasingly important in giving Norway a competitive trade advantage. Thus, farmers gradually diversified their income and activities across the farming, fishing, and wood industry. Fish, lumber, and metals were either exported to Europe or were traded within the union (Tranberg, 1997, p. 106). Farmers from the west coast would travel over the mountains to Kongsberg, Drammen and Christiania with food, tallow and other necessities (Tranberg, 1997, p. 119).

Even though agricultural activities dominated most households, Norway was loosely divided into a forest-intensive region in the east and south-east, and a fishing region at the west coast and in the northern regions of the country. Its long coast and highly-populated coastal areas made Norway into one of the leading shipping nations in Europe during the 1600s and 1700s (Dyrvik, 1999, p. 111). Cities in the Sønnafjelske region, and those stretching down the south-east coast, became increasingly important in maritime and shipping. However, Bergen remained the largest domestic market and the most important harbor for maritime export (Tranberg, 1997, p. 108).

3.3.1 The Wood Industry

The wood industry brought a lot of revenue to Norway through products such as planks, lumber, and timber, as well as other secondary products, which were used as fuels (Sogner, 1996, p. 137–139). Countries such as the Netherlands, England, Denmark, and France were important buyers of wood products, such as lumber and planks. England became an increasingly important buyer of fish and lumber from Norway from 1651 and onward (Figenbaum, 2009, p. 9). Furthermore, the industry from the mid-1700s increased its national importance and started to manufacture a greater amount of ships, instead of importing them. In fact, between 1760–1767, Arendal experienced a tonnage growth of 20%.

The Sønnafjelske region was the core of this industry, which meant that cities along this coast were directly impacted by any policy changes that affected the industry. Due to rigorous economic activity, there was an ongoing fear from authorities that the industry would deplete Norwegian forests (Sogner, 1996, p. 138–139). Already in 1688, the number of sawmills used for exporting lumber and wood on the south-east coast was halved, due to a new policy, known as *sagbruksprivilegiene* ("sawmill privileges"), and was in place until 1795 (Eliassen, 2015, p. 10–11). The remaining sawmills were given an upper limit on how much they could produce of *kjøpmannsbord*, a type of high-quality planks sold as exports. Despite this, the production of lumber expanded significantly in the 18th century, and its role became increasingly important in the export sector (Njåstad, 2011, p. 162). Christiania exported one million planks in 1731, and two million in 1752. During the same period, Drammen increased its export by 44% (Sogner, 1996, p. 139).

In 1739, a Forestry Directorate, named *Generalforstamtet*, was established as part of the national government. It regulated major parts of the industry during the period 1739–1746 and 1760–1771 (Fryjordet, 1968, p. 17). Its long-running goal was to preserve the country's forests, and it implemented many regulations to accomplish this, including tax requirements (Coldevin, 1963, p. 309). However, the regulations were weakly enforced, due to constant opposition from local officials, farmers and lumber tradesmen (Fyrjordet, 1968, p. 193; Eliassen, 2015, p. 12). The industry faced a slight setback in the 1730s and 40s, likely due to regulations suppressing growth and revenues, but it was restored from 1750s and onward (Sogner, 1999, p. 139). Despite regulatory attempts, the industry's profits increased, and prices doubled in the period from 1730 to 1750. In 1766, Christiania, Drammen, and Fredrikstad exported lumber worth 143,000, 80,000 and 46,000 riksdaler, respectively.

The Directorate disbanded in 1746, due to the constant complaints of farmers, lumber tradesmen, and officials (Fyrjordet, 1968, p. 191). This led to a power vacuum in the industry, in which lumber tradesmen, officials, and farmers could finally resume decision power (Eliassen, 2015, p. 15; Coldevin, 1963, p. 309). In 1752, the government made an effort of its own to try and control the industry, outlawing all transportation of lumber from Nordland, even if it was carried out inside the country (Coldevin, 1963, p. 309). In 1760, an attempt to create a second Forestry Directory was made, but it was not particularly successful, and the Directory disbanded again in 1771. In general, the industry was quite profitable, and the many attempts to control it were therefore profoundly unpopular, explaining why most of the regulations failed.

3.3.2 The Fishing Industry

Norway's geography provided a natural opportunity to develop a solid maritime and fishing industry. Therefore, it was lucrative for households to establish themselves close to the coast. Fish was especially important in generating export revenue (Tranberg, 1997, p. 106–108). Thus, domestic migration from the countryside to coastal cities was common, since coastal regions were relatively more urbanized (Sogner, 1976 & Stoa, 1982 cited in Døssland, Løseth, & Elstad, 2014 p. 191). Conditions for population growth were better on the countryside than by the coasts, since people there were more shielded from extreme climatic shocks, which meant that families took a risk in moving to the coast (Døssland et al., 2014, p. 205). Fish was also important for household consumption, especially fish of lower quality that could not be exported (Sogner, 1999, p. 128).

At the coast, fish accounted for a significant part of a household's diet, but grain and dairy products were also essential (Njåstad, 2011, p. 174). Furthermore, drying and salting fish were common methods to preserve and store fish over longer periods of time. This resulted in dried fish (stockfish) becaming common in household diets. Fishing increased in the period from 1720 (Moseng et al., 2003, p. 271–272). The 1750s were a particularly good period for those who fished herring. Meanwhile, 1760–1770s was a period of many setbacks, as the amount of fishing decreased. In other words, the supply of fish fluctuated to a large degree, which, as we will show in Chapter 8, had a substantial impact on prices. According to Moseng et al. (2003, p. 272) these fluctuations often made people living on the coast reluctant to commit to professional fishing. Even in the most prominent fishing areas, agriculture was the main reason for people settling down. However, many had fishing as a secondary means of income, using it to support themselves when harvests were low.

3.4 Grain and Iron Monopolies

Mercantilism and protectionism often worked by regulating markets, for example by giving certain producers monopolies, or by setting tariffs. In our thesis, this can be seen in two instances: the Danish monopoly for grain in Norway, and the Norwegian monopoly for iron in Denmark (Dyrvik, 1999, p. 167).

Denmark struggled with its agriculture in the century 1650–1750, and the period after the Nordic war represented a particularly low point (Dyrvik, 2011, p. 195). Thus, the idea to combine the Norwegian and Danish market for grain rose. In 1735, a grain monopoly was implemented in the south-eastern and southern regions of Norway (Sønnafjelske), including municipalities such as Østlandet and Agder. This meant that these regions could only import Danish grain. Norwegians claimed, however, that the Danes dumped their worst quality grain to Norway, and at an unreasonably high price (Dyrvik, 2011, p. 195). The monopoly for grain was lifted during the toughest years, when supply was scarce: 1742–43, 1748–49 and 1756 (Sogner, 1996, p. 121). However, due to the geographic proximity between southern Norway and Denmark, the harvests and weather fluctuations in Denmark and Norway often followed similar trends. The monopoly was therefore deemed to have been rather unsuccessful and was ended by King Fredrik V in 1788 (Sogner, 1999, p. 121).

The production of iron was important and lucrative in Norway during the mid to late 18th century (Sogner, 1996, p. 121). Thus, another example of mercantilism could be seen in the period 1730–1776, when the Norwegian iron industry had monopoly power in Denmark, under the condition that the price remained under eleven riksdaler for every ship pound (159 kilograms). Knowledge and research on the effect of the monopoly on Norway is scarce since the monopoly was conditional on price, and Denmark could thus substitute Norwegian iron for Swedish, if the price was above eleven riksdaler. The price was stable between 10–12 riksdaler between 1730–1790, and it is believed that the monopoly power was advantageous for Norwegian manufacturers (Sogner, 1996, p. 121). King Fredrik V ended the iron monopoly in 1791. As with the repeal of the grain monopoly, this was done as an effort to move the union towards liberalization.

3.5 Demographic Crisis

As mentioned before, Norwegian diets were heavily dependent on harvested commodities. This dependency was not without its costs. Most notably, it made the populace quite vulnerable to sudden and dramatic changes in the climate, as this could result in crop failure. At its worst, failing crops could lead to extreme food shortage, which in turn could result in catastrophic death tolls.

A famine struck Norway in 1741 and 1742 (Daae, 1868, p. 331). This was a result of colder summer weather in 1739, which caused poorer harvests in the subsequent fall season. Daae states that winter of 1739 was also frigid. Herstad (2000, p. 277) argues that crops already started to show signs of failure in 1735, but agrees with Daae that they hit their worst levels in 1739. These extreme conditions during this period were also found in Sweden, Finland, and France. Herstad (2000, p. 259) states that prices of grain had to increase by 75–100% compared to prices from 1720–1734 for a region to be classified as harmed by food shortage. He finds that old price currents from the Sønnafjelske market towns show this.

Inhabitants in Sønnafjelske region were hit hardest by the crisis (Daae, 1868, p. 333; Herstad, 2000, p. 277). In the years 1740–1743, the total number of deaths in the region was between 61,500 and 71,700 (Hennings, 1786 & Drake, 1969 cited in Herstad, 2000, p. 242). This was twice as high as the second-highest death toll at the regional level for the four-year period. According to Daae (1868, p. 333) and Herstad (2000, p. 277), the higher death tolls can largely be explained by the restrictions set by grain monopoly. The supply of grain was already running low because of the failing crops, and since the monopoly banned the opportunity to import grain from other countries, the effects of the famine were amplified in this part of the country. However, restrictions were eventually loosened in 1740, and the import of grain increased massively for the entire country in the following years (Herstad, 2000, p. 303).

In 1743, the crisis ended, as harvests restored back to normal levels (Daae, 1868, p. 338). However, there is reason to believe that, although the direct crisis caused by crop failure only lasted two years, it had other consequences on demographics, even in the years that followed. According to Dyrvik (1983) and Herstad (2000), famine and disease likely had a simultaneous effect on demographic statistics, since malnutrition due to crop failure often made civilians susceptible to succumb to diseases when they were hit. This was evident in Arendal, where the spotted fever claimed 100 lives in 1742, twice as many as in a normal year (Herstad, 2000, p. 274). Therefore, the after-effects of the famine may have suppressed economic activity and had consequences for demographic development.

3.6 Wars and Conflicts

While the period we study in this thesis was generally characterized by peace the national level, there were conflicts abroad that sometimes affected Norway, especially when Sweden and Denmark were involved. The most notable conflicts were the Second Silesian War and the Seven Years' War. Wars generally impacted the economy through several channels, and in the context of the decades studied in this thesis, the most important were state finances and trade.

The Second Silesian War broke out in 1744, as part of the Austrian War of Succession (1740–1748), fought between Prussia and Austria (Dypvik, 2017). The war ended in 1745, and while Norway was not an active participant, we will later argue that the conflict nonetheless had a direct effect on the Norwegian economy.

In the summer of 1755, Swedish ships were attacked by English forces, who were engaged in armed conflict with French colonists in America (Coldevin, 1963, p. 324–326). The attack happened in Danish territory. Both the English and the French treated these neutral ships harshly, and Sweden and Denmark-Norway responded by cooperating to protect their trading. Later, in 1756, the Seven Years' War broke out. While Sweden was an active participant, Denmark-Norway largely stayed out of the conflict, but still invested in protective measures and armed neutrality (Qvigstad, 2005, p. 17). In 1756, when the war approached the southern Danish border, Norway mobilized 13,000 Norwegian troops. This was financed by the government increasing taxes (Coldevin, 1963, p. 324–326). Kurantbanken also started printing more bank notes to finance the war, which substantially increased the money supply (Qvigstad, 2005, p. 18). In 1761, Denmark-Norway mobilized more troops, a new czar, Peter the Third, ascended to the throne of the Russian empire and marched into Denmark (Qvigstad, 2005, p. 18–19). However, he was assassinated shortly after, and his successor, Catherine the Great, averted further conflict.

According to Qvigstad (2005, p. 18), government expenditure in the union doubled from 5 million to 10 million riksdaler during the Seven Years' War, and government debt quadrupled from 2.5 million to 20 million riksdaler in 1756–1761. The expenditure was initially not financed by tax revenues, explaining why it soared to new heights in only a few years. Embezzlement and mismanagement of state finances further impacted the debt levels negatively, and the German businessman Heinrich Schimmelmann was hired to reduce the state's debt (Coldevin, 1963, p. 328). In 1762, he levied a poll-tax of one riksdaler on all individuals over twelve years of age, including men, women, children, and even lepers in the hospitals. The war ended in 1763, and government expenditure began to decrease again. After 1766, the debt also began (Qvigstad, 2005, p. 18).

3.7 Summary

There was a variety of factors that characterized the Norwegian economy during the 18th century. Wood and fish gave the country a trade advantage, and agriculture was central to livelihood. The wood industry was quite lucrative, and there were many attempts to regulate it throughout the period, most of them unsuccessful. The national economic policy was driven by mercantilism, which resulted in monopolies for grain and iron. In the early 1740s, the country was struck by a crop failure, which was worsened by the grain monopoly restricting necessary imports. A series of wars also characterized the mid-18th century. And while Norway was not directly engaged in any of them in the years 1733–1766, they still mobilized troops, which increased government expenses. In Chapter 8, we show how all of these events and conditions could contribute to large changes in the general price level.

4 Economic Theory

In this chapter, we present the economic theory that we will use to analyze our findings. We show how inflation is measured, and discuss its different causes. The latter point is important, as the causes of inflation differ in the short run and the long run.

4.1 Price Indices and Inflation

Inflation is measured as a percentage change in the general price level between two time periods, as shown in equation (1).

$$\Delta P_t = \frac{P_t - P_{t-1}}{P_{t-1}} \cdot 100\% \tag{1}$$

Measuring inflation is typically done by creating a consumer price index (CPI). A CPI measures the price level of a market basket of goods and services for a representative household. Inflation is measured by comparing the price of the basket over time, where its contents are updated with changing consumption trends. Note that Statistics Norway did not start using CPIs until 1959 (Grytten, 2004, p. 72). Before that, they used cost of living indices to measure inflation, which is also what we use in this thesis. We present the details on how we construct our indices in Chapter 6.

4.2 Keynesian Theory

According to Gordon (2012, p. 268), Keynesian economics separates inflation into different types, namely *demand-pull inflation* and *cost-push inflation*. Demand-pull inflation is caused by a positive shock to aggregate demand, and cost-push inflation is caused by a negative shock to aggregate supply. If inflation decreases (disinflation) or turns into deflation, this is either due to a negative shock to aggregate demand, or a positive shock to aggregate supply.

4.2.1 Aggregate Demand

Aggregate demand (AD), shown in equation (2), is defined as the total amount of desired spending expressed in a nominal currency (Gordon, 2012, p. 55). A shock to AD is defined as a significant change in desired spending by consumers, business firms, the government, or foreign countries (Gordon, 2012, p. 55).

$$AD = C + I + G + NX \tag{2}$$

Here, C is consumption, I is investments, G is government spending, and NX is net exports (exports minus imports). Later, we will show that shocks to AD had many causes during the 18th century, including changes in trade and government spending, the latter often occurring due to war.

4.2.2 Aggregate Supply

Aggregate supply (AS) is expressed differently in the short and the long run. In this thesis, we primarily focus on short-run aggregate supply (SRAS), shown in equation (3). This equation relates inflation π in period t with three variables: inflation from the previous period, π_{t-1}; short-run output $\tilde{Y}_t$, where $\bar{v}$ in an exogenous coefficient; and inflation shocks, $\bar{o}$.

$$\pi_t = \pi_{t-1} + \bar{v}\tilde{Y}_t + \bar{o} \tag{3}$$

A shock to AS can happen for a variety of reasons. A negative shock can occur if crop failure limits the supply of harvested commodities. Crops often fail because of the weather, meaning the ensuing inflation is often temporary, lasting a year or two before returning to normal (Gordon, 2012, p. 284). Another cause might be increased regulations, where the government sets standards for a certain industry, thereby making it harder to produce the same amount of products as before. This reduces supply, which increases the price level.

4.3 Quantity Theory

While shocks to aggregate demand or aggregate supply may cause inflation in the short run, the quantity theory of money states that inflation in the long run is primarily caused by an expansion in the money supply. This theory connects prices in the economy with money, the relationship of which is expressed in equation (4), the *quantity equation*.

$$M_t V_t = P_t Y_t \tag{4}$$

Here, M_t is the amount of money in circulation, V_t is the velocity of money, P_t is the price level in the economy, and Y_t is the amount of goods and services purchased. V_t is typically assumed to be constant in the long run. By solving this equation for the growth rate of prices, we show that inflation is a function of the growth in the money supply, less the growth in real GDP. This is expressed in equation (5). We can view the growth in real GDP as a constant, as this is assumed to hold in the long run.

$$\pi^* = \bar{g}_M - \bar{g}_Y \tag{5}$$

The implication of this is that an increase in the money supply is what primarily decides the level of inflation. This further implies the proposition known as the *neutrality of money*, which claims that the money supply only has an effect on nominal values in the economy, and not real values.

Although monetary policy was not formally established in the 18th century, it was not non-existent. Qvigstad (2005, p. 23–24) explains that the value of the riksdaler in the 18th century was reflected in the amount of silver it contained. In other words, the metal standard worked as a nominal anchor, pinning down the price level (Qvigstad, 2005, p. 22). Between 1737 and 1757, the value of paper notes was linked to silver through an obligation to exchange notes for silver. Thus, the average price level would remain constant as long as the amount of silver in the economy did not grow faster than real output. Convertibility of the bank notes was temporarily suspended between 1745–1747 and permanently in 1757, implying that silver riksdaler coins were no longer valid as legal tender (Abildgren, 2010, p. 18). Increased money supply weakened the nominal anchor in the following decades, as the bank used the printing press excessively to finance the state's debt (Qvigstad, 2005, p. 22).

5 Data and Sources

In this chapter, we present the source behind the price data we use to construct the indices, and discuss its validity and reliability in the context of the thesis. We then explain the necessary steps taken to collect and refine the data, in order make a final workable data set that can be used to construct indices. Lastly, we discuss the role of interpolation, and how we used it to solve lacunae in the price series.

5.1 The Database

All data is retrieved from the digital project *Historiske toll- og skipsanløpslister*, roughly translated to "Historical Customs and Port Call Lists." The project consists of several databases that include data on trade and ship traffic in pre-industrial Norway (Historiske toll- og skipsanløpslister, 2017a). We make use of the historical prices database, which provides extensive data on monthly price currents (*riksdaler courant*) from 23 cities. The prices are of domestic commodities, unless stated otherwise. Price currents were set at the end of each month, and provide information on the most common price that was paid in current coins for the commodity. The prevalent price currents were often noted or registered, which helped communicate the prevalent prices for the commodities to traders (Historiske toll- og skipsanløpslister, 2017d). The database contains price currents for most so-called *kjøpsteder*, or market towns, in Sønnafjelske region for the period 1736—1766 (Historiske toll- og skipsanløpslister, 2017d). Since the database consists of data from these towns, it was therefore relatively straightforward to extract and use their price data from Arendal, Christiania, Drammen, Fredrikstad, and Kristiansand for the 31-year period. The original monthly price currents are digitally available in the database.

Since we only focus on five cities in the thesis, it can be useful to know when they achieved the status as a market town. This is shown in table 5.1 below. The fact that most cities had the status of a market town strengthens the argument of using price data from these cities. Although Drammen did not receive its status until the 19th century, it was the most important shipping port in Norway for wood products, like lumber, especially from the mid-1700s and onward (Drammen Kommune, 2016).

Table 5.1: Cities, Town Status and Location (Johansen, 2007)

Town name	Town status and year	Location
Arendal	1723	South-East
Christiania (Olso)	1000	East
Drammen	1811	East
Fredrikstad	1567	East
Kristiansand	1641	South

Historiske toll- og skipsanløpslister was developed by the independent project group *Historisk infrastruktur*[1], in collaboration with the Norwegian Maritime Museum, the Norwegian Museum of Cultural History, and the Norwegian Institute of Local History (Historiske toll- og skipsanløpslister, 2017c). In order for Historisk infrastruktur to have created a workable and accessible database, they have transcribed, modernized and standardized the original, handwritten price currents. They have tabulated prices with a "from"-price and "to"-price for each commodity and each month, which denotes an interval of the price current of a commodity for a given month. They also provide an arithmetically weighted average price at the end of the period. The average is weighted according to the number of days a price existed. The weighted averages also have a "to"- and "from"-price interval.

5.2 Reliability

Reliability is the extent to which the data provides consistent results (Wilson, 2014, p. 132). Since we are dealing with historical data, there may be scenarios where reliability is challenged. These scenarios are important to be aware of when constructing the indices. Klovland (2014, p. 5) states that in general, methods of transcribing, or the quality of descriptions of commodities, may change over time, making it hard to isolate the exact reason behind discrepancies or inconsistencies in price series. Inconsistencies imply that the tabulated price deviates from a commodity's general trend. To ensure that human error does not compromise the database's quality and content, the project team states that they made spot checks on 10% of the tables. If they found an error, the table was revised completely (Historiske toll- og skipsanløpslister, 2017b). This ensures greater quality and reliability of the listed prices. We also double-checked the consistency of the price observations, in cases where a price clearly deviated or did not seem economically

[1]Today, Historisk infrastruktur are part of Tidvis AS, after the Norwegian Institute of Local History and the Norwegian National Library merged on 1st January, 2017.

plausible. There were only a handful of instances where we found unreliable or clearly erroneous prices, which we had to revise through interpolation, or by taking an average of the previous and following year. Furthermore, the original customs documents are also available on the database, strengthening the reliability of the published price currents, as it made it possible for us to confirm or reject inconsistencies.

In some cities, there may be cases where a commodity is listed without a price for a whole year, resulting in the arithmetic price being empty. We then assume that the price has not changed from the year before. We made this assumption in accordance with the information provided by Historiske toll- og Skipsanløpslister. In some years, both a commodity and its price is not listed. Here, we do not assume that the price was unchanged, but rather that there is no available information for it. We use interpolation to deal with such lacunae. We explain its technique in more detail in section 5.5.

5.3 Validity

Validity refers to whether the data measures what it is intended to measure (Wilson, 2014, p. 134). The price data needs to be valid in order for us to use it to construct meaningful indices and draw meaningful conclusions. In this thesis, the historical prices should give sound insights into the purchasing power of consumers, and the valuation of commodities during the time period.

We assume that using the yearly arithmetic average of the "from"-prices for each commodity in each of the five cities is sufficient when creating the indices. We use "from"-prices since there are more observations of them, compared to the "to"-prices, which there are quite few of. However, there are instances when the average "from"-price clearly deviates from the price trend, for example by a factor of ten. In these cases, we drop said observation, and calculate a new price by using a substitute commodity, or by using an average price from the previous and following year, which we consider to be better options than omitting the commodity altogether. This strengthens the consistency and validity of the data.

The validity could also have been affected by registration errors made in the 1700s. For instance, a price measurement might have been forgotten, or there might have been illegal activities—such as smuggling—that affected the registration of prices or underestimated the amounts of commodities listed (Historiske toll- og skipsanløpslister, 2017b). However, we still consider the database to be a reliable source, as it provides more accurate data, compared to other sources on this topic.

There are also certain commodities that are listed for a certain consecutive period, but then are missing for another consecutive period. For example, pork in Fredrikstad is present in price currents from 1737–1748. However, from 1748–1755 there are no accounts of its prices. In 1756, pork is registered again, but without a price. We then assume that the price is the same as the last registered price in 1748. We base this assumption on information on how such registries are structured, where it is common practice to not list a price when it does not change.

5.4 Data Collection

It is useful to illustrate how we collect and process the raw data from the database to make our own spreadsheet of prices, which will become the foundation for constructing the revised price indices. The indices cannot be constructed directly from the tables provided from the database, so we have to refine and make necessary adjustments to the data. We first manually extract the yearly arithmetic averages of all the "from"-price currents for the period 1736—1766, by creating separate spreadsheets for each of the five cities. Secondly, we convert prices to get workable results. The database lists the prices of the commodities according to the price standards of the 1700s, meaning riksdaler is listed in a 10-digit system, and schilling in a 12-digit system. When creating a price index, it is necessary to use a full 10-digit system, meaning we have to convert the schilling. This is done by dividing the listed price in schillings by 0.96, due to the fact that one riksdaler was divided into 96 schillings (Coldevin, 1963, p. 483).

After tabulating all the commodities for the five cities for the period, and converting the prices, we carefully eliminate commodities that have too few price observations. Interpolating commodities with too few observations will lead to incorrect and unreliable estimates, consequently harming the validity of the indices. Often, these commodities only have one to ten observations, in as few as one to two cities, for the entire 31-year period. Some of these commodities were uncommon or unimportant for household consumption at the time, and it makes sense to exclude them. Some of the excluded commodities are simply a variation of another similar commodity, making it easy to find a substitute commodity with enough observations. Although we exclude a total of 92 commodities (see Appendix H), we are confident that the remaining commodities are representative of an average household's consumption. The resulting data set for constructing the index consists of 52 commodities (see Appendix A).

5.4.1 Measurement Units

All the prices are measured in specific units, which may differ across commodities. For example, cheese is measured in ship pounds, while butter is measured in barrels. Dry, harvested commodities were sold in barrels. This is not a problem as long as a price is measured consistently in the same unit. However, if units differ within the same commodity, the prices for that commodity cannot be compared to each other. This makes it necessary to find a common unit for measurement. Note that most of these units are not in use anymore. Some were even specific to geographic regions, making it necessary to find their relationships by consulting relevant literature (Hofstad, 2018a; Hofstad, 2018b; Hofstad, 2017; Kjærsgaard, 2018; Coldevin, 1963, p. 483; Klovland, 2013, p. 4).

Table 5.2 gives the full overview of all the units of measurement used in this thesis. We list the units in their original form in Norwegian, to make consultation with sources and comparison with the original data set easier. Commodities that are listed in large units of measurements indicate wholesale transactions (Klovland, 2013, p. 4).

Table 5.2: Units of Measurement and Conversions

Unit of Measurement	Unit
1 tønne (barrel)	139 litres
1 pund	0.5 kg
1 bismerpund	5.977 kg
1 lispund	8.0 kg
1 våge	18.0 kg
1 skippund	159.277 kg
1 åtting	13.9 kg
1 fjerding	46.3 kg

Our conversions rarely lead to inconsistent results. In the few instances where this is the case—likely due to human error during transcribing—we use interpolation to solve the problem. Furthermore, if two or more reliable prices are listed in the same year for the same commodity (i.e duplicate names), but in different units, we convert the prices to a common unit, and use an average of the prices. After defining our workable data set and making necessary adjustments, we create a spreadsheet containing arithmetic averages of the "from"-prices for all 52 commodities, based on all five cities. This final spreadsheet provides the foundation for interpolating prices where necessary, and finally computing the commodity, group, and aggregate indices.

5.5 Lacunae and Interpolation

While the original data set is valid and reliable, lacunae are to be expected with historical data. They might occur for a variety of reasons. Klovland (2014, p. 5) states that lacunae are often common for agricultural commodities, since crop failures may distort the price series. Another reason might be the comprehensive nature of the material, which could have led to erroneous entries. However, since the index needs observations for all years, measures need to be taken to correct such lacunae. The method for doing so is called *interpolation*.

Interpolation works by finding substitute commodities that follow a similar price trend to the one where prices are missing, and calculating what the price would be, based on said trend. One example of this is grains, of which the data set does not have prices for in the interval 1744–1747. Since barley seems to follow a similar price trend to grains, and has complete data, it is deemed to be a worthy substitute. In order to find a price for grains in 1744, we calculate the ratio of the prices of barley in 1743 and 1744, and then multiply it with the price of grains in 1743, the last year before the gap. Similarly, for 1745, we multiply the ratio of barley prices in 1743 and 1745 with the price of grains in 1743. We hold the last year before the gap constant, but change the year of the missing price.

For commodities that account for larger weights, such as cereals, grains, dairy, pork and iron, we only need to interpolate one to two observations. In some cases, especially with wood and firewood and tallow, there are several missing price observations, but few price changes across the period. This results in fairly constant interpolated prices. Furthermore, these commodities are listed extensively in just one city, making it impossible to calculate an arithmetic average across five cities. We believe that the extensive interpolation of wood and firewood commodities is justified by the fact that the cities were important contributors to the wood industry. Therefore, we still include most of these commodities, on the basis that their inclusion at the group level is more valuable than their omission. Appendix I shows the overview of all interpolated commodities.

5.6 Summary

Using historical data has its challenges, and we have discussed them openly here, to demonstrate awareness and provide solutions for how we treat or solve inconsistencies or unfamiliar prices in the database. Just as Historisk infrastruktur took measures to defend the reliability and validity of the data, our additional measures ensure that we refine the data when necessary, which turns it into a solid foundation for constructing indices.

6 Method

In this chapter, we cover the steps behind constructing the index: choosing the base year, grouping and weighting of commodities, and finally using the Laspeyres index to construct commodity and group indices.

6.1 Base Year

We first choose the base year, where we set the price level to the index value of 100. Subsequently, we express the price level of years preceding and following said base year as the ratio of the value in the base year. In practice, this means that if prices are twice as high in one year compared to the base year, the index number of that year will be equal to 200. If the index value in a given year is 100, consumers have the same purchasing power in that year as they do in the base year. The ideal base year should be representative for the whole period, and should preferably be found approximately in the middle of said period (Grytten, 1999, p. 219). Grytten (2004) underlines the importance of choosing a sufficient year, as it allocates the relative importance of the weights of consumer commodities. In this thesis, we choose 1750 as the base year. Furthermore, 1750 is one of the more complete years in the data set across all five cities, with little missing data.

6.2 Constructing the Indices

As detailed in the Data chapter, we calculate arithmetic average prices for the commodities, in the case where a price for a commodity is listed in more than one city. Note that each city is weighted the same in our index, on the basis that all five cities played an important role in Norway and the Sønnafjelske region. Here, the average prices are used to construct commodity indices, which are indices for individuals commodities. These indices are denoted as I_i, for each commodity i. As detailed in equation (6), we construct these indices by calculating the relative price from the base year b to the index year t. These are first-order indices.

$$I_i{}^t = \frac{p_t^i}{p_b^i} \tag{6}$$

Following the construction of the commodity indices, we create second-order indices, where we add the commodity indices into consumption group indices I_g. For each group g, each commodity is weighted according to their relative share in a household's budget, as shown in equation (7):

$$w_i{}^b = \frac{p_i^b q_i^b}{\sum(p_i^b q_i^b)} \tag{7}$$

Equation (8) shows the calculation for the second-order indices, which represent sub-indices for each consumer group.

$$I_g{}^t = \sum(w_i^b I_i^t) \tag{8}$$

The second-order indices for the consumption groups are then aggregated. We allocate weights to the groups according to their relative share of total consumption in the base year. Equation (9) shows the calculation for the weight of the commodity groups:

$$w_g{}^b = \frac{p_g^b q_g^b}{\sum(p_g^b q_g^b)} \tag{9}$$

Finally, we find the sum of the weighted second-order indices to get the Laspeyres price index, as shown in equation (10). This is a third-order index.

$$I_L = \sum(w_g^b I_g^t) \tag{10}$$

In the Laspeyres index, the consumption weights remain fixed throughout the series. This means that the index does not take into account substitution effects, which is when consumers make relative changes to consumption when the price of a commodity changes, assuming everything else held equal. From this, it follows that Laspeyres will overstate inflation. Furthermore, this is an arithmetic index. It is possible to use geometric indices, which would take the substitution effects into account, theoretically speaking. However, since these effects will be mathematically and not empirically founded, it cannot be stated that one approach is more valid than the other (Grytten, 2004, p. 51). The Paasche index is a common alternative to the Laspeyres index, but uses current prices and quantities instead of a base year. However, since we do not have data on changing consumption, we cannot apply the Paasche index in our methodology.

6.3 Weighting

The weighting of a commodity should reflect its consumption share for a household in the given time period. In order to create an accurate representation of consumption trends from the period, we have used Grytten (2018) and Klovland (2013), both of whom provide valuable insight of consumption in Norway during the 18th century. Our findings from the history chapter also help in understanding which groups were relatively important for household consumption.

Although we consider all of the consulted sources and our weights to be valid for creating accurate indices, there are certain limitations in the data set that make the weighting slightly challenging. The first of the limitations concerns the fact that some of the groups have few commodities. Ideally, each group should have a wide selection of commodities. For example, the data set includes only one type of vegetable, namely peas. Vegetables is an important group, which should justify a relatively high weight. However, because of the lack of variation of commodities within the group, there is a need for a slightly lower weight.

The second limitation is that some commodities, such as wood and firewood, are found in a limited number of cities, or sometimes even just one city. This makes it difficult, and sometimes even impossible, to calculate an average, making the price data for such goods slightly less reliable. Since we prefer that price observations should be fairly equal from each city, we also give lower weights to commodities or groups found in few cities. The third and final limitation concerns the fact that some commodities lack observations in certain years. We remedy this by using interpolation, where the groups drinks, fish, wood, firewood & tallow are the most interpolated. While interpolation is a standard technique to use when lacking data for certain time periods, the fact remains that the values it produces are estimates, not observations, justifying the use of lower weights.

6.3.1 Chosen Weights

Ideally, the weighting of commodities should be based on empirical findings about consumer behavior only. However, it is sometimes necessary to be discretionary when writing a historical thesis, as historical data will almost always be more limited than contemporary data. But although the data set has its limitations, we still consider it to be both strong and valid. mainly because of its size. Since it consists of as much as 52 commodities, which is a larger data set compared to Grytten (2004), it is more than adequate for constructing the three price indices.

Table 6.1 shows the weights for the wholesale price index. Grains and groats have the highest weights, primarily because of their importance in consumption, but also because they have a diverse set of commodities. These two groups also have few lacunae. Meanwhile, vegetables and drinks are given lower weights, again because of less importance in consumption habits, and also because they have only one commodity each. Fishing and wood were important industries in generating export revenue and household income, but less important than grains in terms of household consumption and livelihood. Furthermore, prices of fish and wood were relatively heavily interpolated.

Table 6.1: Weighted Commodity Groups for the WPI

Group	Weight (%)
Grains	20.0
Groats	17.5
Vegetables	5.0
Dairy Products	10.0
Meat	10.0
Iron	5.0
Drinks	5.0
Fish	10.0
Wood	12.5
Firewood & Tallow	5.0

Table 6.2 shows the weights for the cost of living index. Since this index does not include wood, and the remaining weights have been scaled up. We use some discretion here. Instead of scaling every commodity up equally, we still give less important groups relatively low weights. For instance, we give cereals a weight that is 1.5 percentage points higher than before, while giving drinks only 1 percentage point more.

Table 6.2: Weighted Commodity Groups for the CLI

Group	Weight (%)
Grains	21.5
Groats	19.5
Vegetables	6.0
Dairy Products	11.5
Meat	11.5
Iron	6.5
Drinks	6.0
Fish	11.0
Firewood & Tallow	6.5

Finally, table 6.3 shows the weights for the producer price index, which consists of three groups: wood, fish, and firewood and tallow. Their weights are scaled up from their share of the total consumption weights from the WPI, since the WPI includes all three groups. Furthermore, it is important that the weights in this context are still in line with historical findings. As detailed by Sogner (1996), the wood industry brought a lot of revenue to the economy and households, justifying the relatively high weighting of wood. The fishery industry was particularly salient in coastal cities, and this justifies its high weight, relative to firewood and tallow. The latter was more important at the household level than at the macro level, and therefore it makes sense that the group firewood and tallow keeps its relatively low weight.

Table 6.3: Weighted Commodity Groups for the PPI

Group	Weight (%)
Wood	45.0
Fish	36.0
Firewood & Tallow	18.0

7 Presenting the Indices

The purpose of this chapter is to act as a preamble to the analysis, where we will incorporate economic and historical insights to try and explain the price developments. Here, we give an overview of the three constructed indices and the inflation rate for the period. First, we show the commodity indices for iron, using both arithmetic and geometric means. Second, we show the three main price indices. Third, we show the inflation rates for the period.

7.1 Arithmetic Versus Geometric Means

All the indices in the thesis are calculated with an arithmetic mean, which, as mentioned, does not take into account that price changes cause substitution effects. Using a geometric mean should, at least in theory, account for this effect. However, it is important to note that we can only use geometric means on a commodity level, and not in the Laspeyres index. There is only one feasible scenario where we can apply the geometric method in this thesis, namely Norwegian and Swedish iron in Christiania. Figure 7.1 graphs the arithmetic and geometric means for these goods. Note that the geometric index includes both the prices of Norwegian and Swedish iron, while the arithmetic index only includes the Norwegian price. Since we lack data about changing consumption, we can not test if the geometric index truly captures any substitution effects.

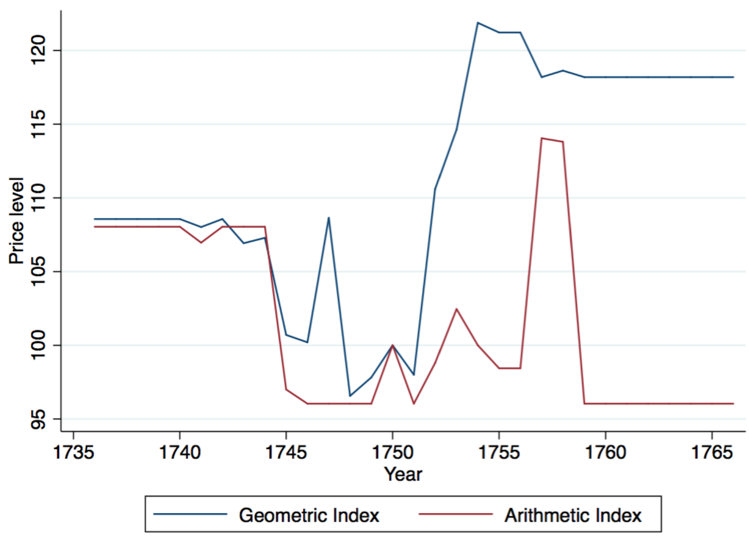

Figure 7.1: Commodity Indices for Norwegian and Swedish Iron (Historiske toll- og skipsanløpslister, 2017e)

Figure 7.1 shows some noticeable differences between the two indices, which might be occurring because of consumers substituting Norwegian iron for Swedish iron, and vice versa. Furthermore, several price shocks affect both the geometric and arithmetic indices at the same time, though not always with equal strength. This is most visible in 1744, 1751 and 1756. Note that we do not intend to use the geometric index in the analysis, primarily because we look at prices at an aggregate level. Its inclusion in this chapter is primarily done to illustrate how it differs from an arithmetic index.

7.2 Aggregate Price Indices for 1736–1766

Figure 7.2 shows the three price indices. We see that the wholesale price and cost of living index are almost identical. Both show large fluctuations, especially compared to today's standards. In addition, we see a slight upwards trend. From the graph, we see four notable price shocks to the WPI and CLI, occurring in the years 1740, 1745, 1755, and 1762. Although we define price shocks as sudden changes to the yearly inflation rate, we choose to illustrate the shocks with the CLI, since they are more noticeable at the absolute level, rather than graphing annual inflation rates. Note that, since inflation measures annual changes in the general price level, its shock will appear one year later than a shock to the price level. Hence, there may be slight discrepancies in the numerical and graphical representation of shocks.

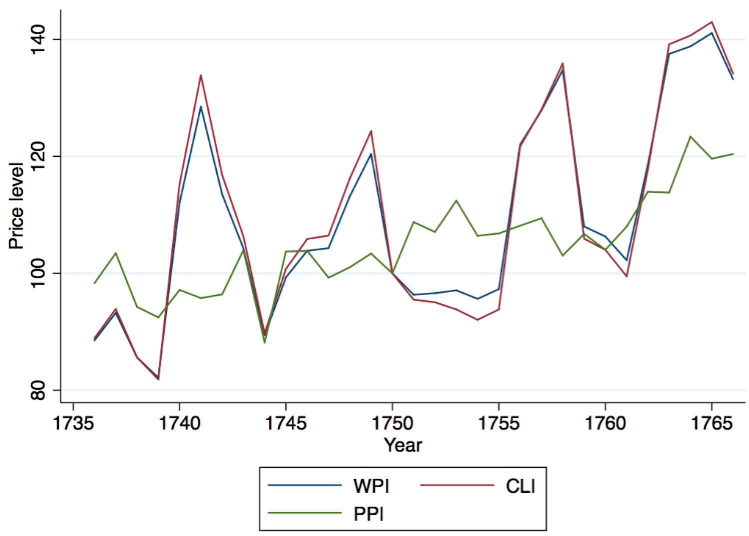

Figure 7.2: Norwegian Prices Indices, 1736–1766, 1750=100 (Historiske toll- og skipsanløpslister, 2017e)

The producer price index is more stable than the CLI and WPI. There are recurrent price shocks, but they are smaller than the ones found in the WPI and the CLI. All three price indices show a slightly positive trend. A long-term upwards trend in the general price level is especially noticeable in the last decade of the series. This indicates a price shock without reversion, where the price level is shifted upwards permanently.

7.2.1 Inflation Rates

Figure 7.3 show the inflation rates implied by the CLI and WPI. The annual inflation rate implied by the CLI is 2.21%, and 2.03% for the WPI. The small difference is due to the CLI excluding wood, which has almost no price movements, apart from a shock in the late 1740s, which we detail later. In addition, wood is a small part of the WPI, with a group weight of 12.50%. Since the price shocks happen at the same time and with roughly the same magnitude, there is little point in using both the WPI and the CLI in the analysis. Since CLIs are more common to use than WPIs when measuring inflation, we primarily focus on the former from here on.

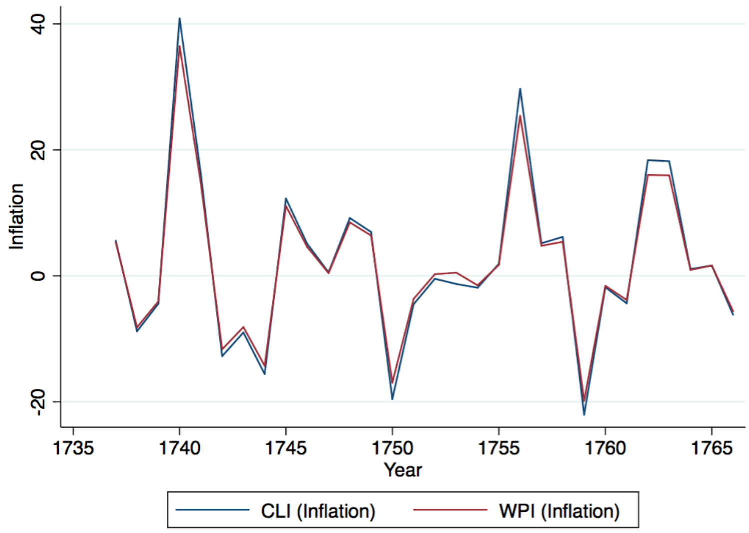

Figure 7.3: Inflation Rates based on the CLI and the WPI, 1736–1766 (Historiske toll- og skipsanløpslister, 2017e)

Multiple features of the CLI's inflation rates are worth pointing out. Firstly, they are often noticeably high, reaching 40.85% in 1740 and 29.71% in 1756. Also, there are several periods of severe deflation, with rates as low as –20% at several points, such as 1750 and 1759. Secondly, the rates fluctuate more than what we usually see in modern times. At several points, high inflation quickly turns into high deflation, with only a few years bridging the two. Finally, it is worth noting that only a few intervals in the series are stable. The most stable period is from 1746 to 1749, where the economy experienced four consecutive years with inflation that stayed under the 10% level. The period 1752–1755 is also relatively stable, with relatively constant deflation that ranges from only –0.5% to –2%.

Qvigstad (2005, p. 7) discusses how positive price shocks generally occur before large negative price shocks. In his study, where he analyzes historical price indices in Norway, he rarely finds examples of large negative price shocks without a preceding positive price shock. Furthermore, periods of deflation last shorter than periods of inflation, indicating that deflation is a correction in price levels following a previous period of inflation. This is quite noticeable in figure 7.3.

7.2.2 The Producer Price Index

Figure 7.4 illustrates how the producer price index changes over the period. Technically, we cannot call this change inflation, since it does not represent a change in the general price level, unlike the changes in WPI and CLI. Nonetheless, it is interesting to see the contrasts between figure 7.3 and 7.4. Compared to the inflation rate implied by the CLI, the change in prices for the PPI are rather distinct. For starters, they are more stable, with less severe inflation and deflation rates. They also fluctuate more systematically; apart from two spikes around 1745, all but two of the price shocks stay within a 10%-range.

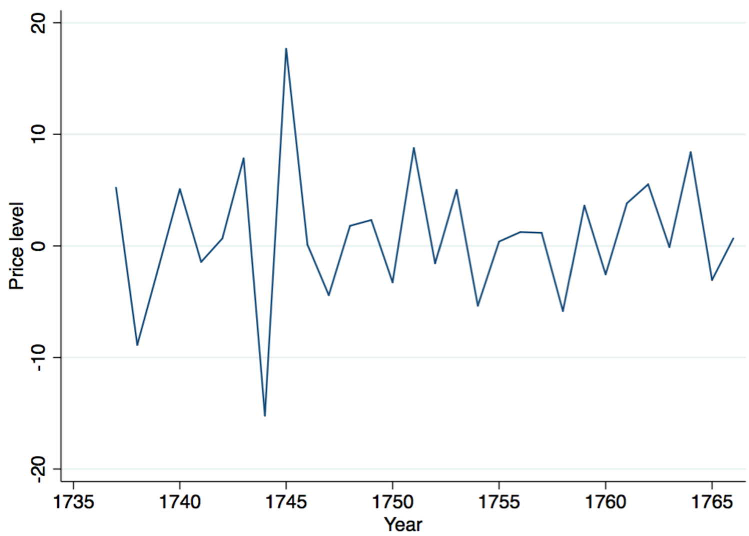

Figure 7.4: Annual Price Changes in the PPI

7.3 Inflation and Autocorrelation

An interesting feature about inflation today is that inflation targeting and incorporated expectations make it possible to estimate the inflation rate for one based on rates found in previous periods. Qvigstad (2005, p. 5–7) analyzes the extent to which high inflation follows high inflation for up to six consecutive years, by looking at autocorrelation—lags in the error term over time—values for inflation for the periods 1667–1913, 1914–1945 and 1945–2004. He finds that inflation rates have become easier to forecast in years after the second world war, where positive autocorrelation is more common and persistent. The results are interesting, but not surprising, given that the information and knowledge of inflation was limited during the 18th century, and that the role of central banks and monetary policy were close to non-existent, compared to today. In fact, Norway did not begin using inflation targeting until 2001 (Qvigstad, 2005, p. 32).

Since we have new data on Norwegian price levels, we can test the annual inflation rates for autocorrelation, to see if we can verify Qvigstad's findings. Figure 7.5 shows a correlogram for autocorrelation in the inflation rate for the entire period studied in this thesis. The spikes show the lags in the error term from each period to the next, and the grey area shows the boundaries for where the lags go from being insignificant to significant, with a 95% confidence interval. All the lags are within the area, meaning they are not significant. Therefore, we conclude that there is no autocorrelation, in line with the findings of Qvigstad (2005, p. 7) for the same period. The main implication of this is that one can not predict inflation rates for one year based on rates in preceding years, as the series is too erratic.

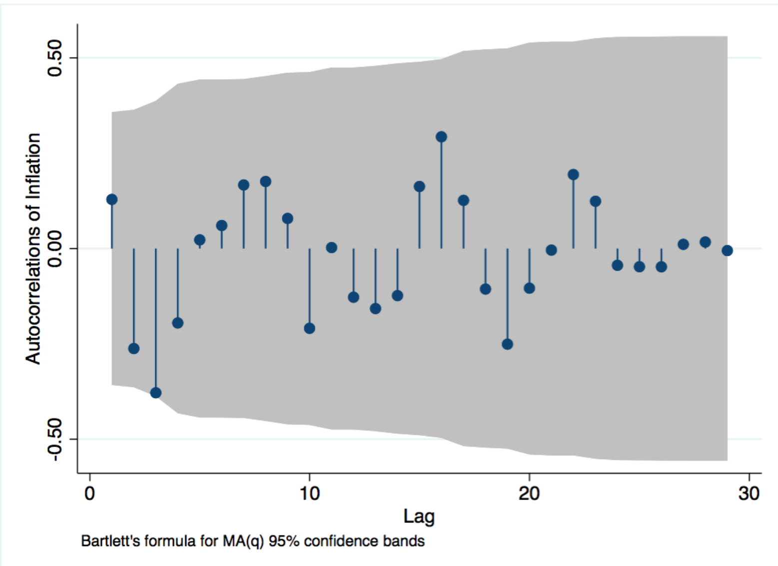

Figure 7.5: Correlogram for the Inflation Rate (CLI)

8 Analysis

In this chapter, we use economic theory and our historical findings to explain the various price shocks found in the indices. We show how the various price movements in the index can be explained by events causing shocks to either aggregate supply or aggregate demand, or, occasionally, an increase in the money supply. First, we analyze the CLI and its price shocks. We have split up this part into four periods: 1736–1744, 1745–1756 and 1757–1766. For each shock, we also present annual inflation rates for the period, calculated as the percentage change in the CLI. We then analyze the PPI in isolation, to give an account of the industry's development. Next, we compare the CLI and inflation rates found in this paper to Grytten (2004), Abildgren (2010) and Edvinsson & Söderberg (2011). Lastly, we give a summary of our main findings.

8.1 The Period 1736–1744

As table 8.1 shows, the first notable price shock in the indices occurred in 1740 and continued into 1741. The shock is highlighted in figure 8.1 on the next page. The inflation rate of 40.85% in 1740 is the absolute highest for the entire 31-year period. Inflation was also high in the following year, with an annual rate of 16.14%.

Table 8.1: Annual Inflation 1736–1744

Year	Inflation Rate
1737	5.59%
1738	–8.80%
1739	–4.43%
1740	40.85%
1741	16.14%
1742	–12.74%
1743	–8.99%
1744	–15.59%
Average Inflation	1.50%

These high rates are likely to be the result of several different causes. The first of these is a below-average cold summer in 1739, which had an extremely adverse effect on subsequent national harvests. The second is the winters of 1739 and 1740 being abnormally harsh compared to preceding years (Daae, 1868; Herstad, 2000). As detailed by Daae (1868) and Herstad (2000), the climatic setbacks led to a period of famine in Norway in 1741 and 1742, which resulted in a high death toll. Together, these events speak in favor of a negative supply shock occurring in 1740, with after-effects lasting until 1742. As access to food became increasingly limited, prices consequently rose to reflect this scarcity. According to Feldbæk (1998, p. 91 in Qvigstad, 2005, p. 16) Fredrik II of Prussia bought large quantities of grain stocks in 1740, to supply food for his army amid the outbreak of the Austrian War of Succession. His purchase of grains likely caused demand-pull in Norway, which augmented the supply shock.

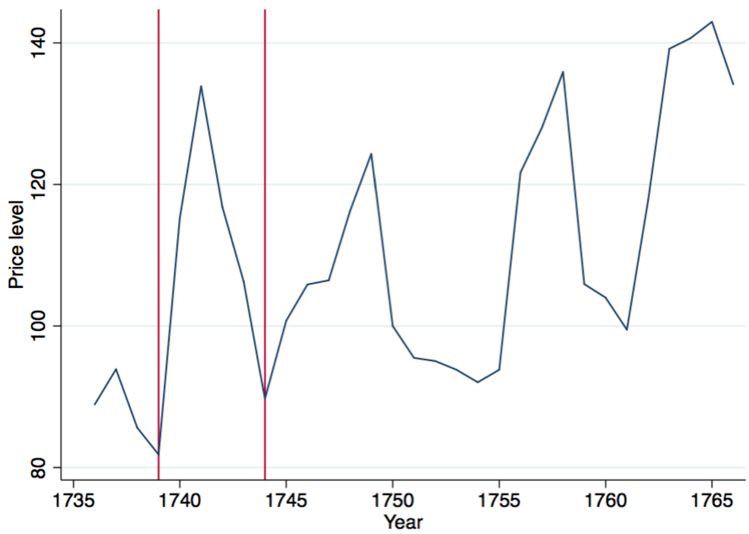

Figure 8.1: First Price Shock, 1750=100 (Historiske toll- og skipsanløp-slister, 2017e)

While the inflation rate was high in 1741, there was deflation in 1742, with prices falling by –12.74%. Prices also kept falling in 1743 and 1744, before returning to more normal levels in the following years. This likely reflects the harvest returning to normal levels in 1743 (Daae, 1868). The fact that prices were still falling after 1743 might be the result of the economy needing time to stabilize after the famine. This is also in line with Qvigstad's (2005, p. 7) argument that deflationary periods are corrective measures in the economy after high inflation. Another factor could be that there was now a relative over-supply of commodities per capita in 1743 and 1744, due to the massive death tolls in the preceding years.

Herstad (2000, p. 272) also argue that famine directly caused citizens to be more susceptible to other fatal diseases and that this further elevated the death toll rate in the short run. Hence, the entirety of price shock—from the crop failure in 1739 to the famine in 1742—is an example of what historians refer to as a demographic crisis, characterized first by famine, and consequently epidemics. The shock, on the whole, seems to reverse itself rather well, since average inflation comes to just 1.5% for the period.

To further verify that the cause of the price shock was crop failure, we can examine the group indices, and check if there are any differences in the prices between harvested and non-harvested goods. Figure 8.2 shows the group indices for grains, groats, and vegetables. These are all harvested commodities, and we see that their prices all rose in 1739–1741. In 1742, prices were falling again, most likely because the monopoly was lifted, consequently increasing imports of grain from Denmark (Herstad, 2000, p. 277).

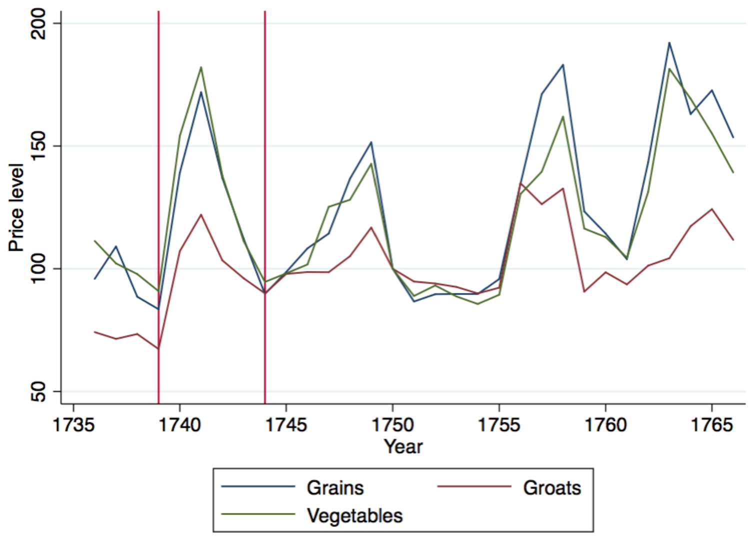

Figure 8.2: Group Indices for Grains, Groats, and Vegetables, 1750=100 (Historiske toll- og skipsanløpslister, 2017e)

Figure 8.3 shows the prices of iron, wood, and firewood and tallow, which are all non-harvested commodities. Neither iron nor wood has positive price growth in the period. Firewood experiences a slight increase, which was likely an effect of the colder weather leading to higher demand for this type of wood in households. Analyzing the price developments of these groups strengthens the argument that the famine caused the price shock, as the prices of iron and wood seem to have been affected by neither the colder climate nor the famine.

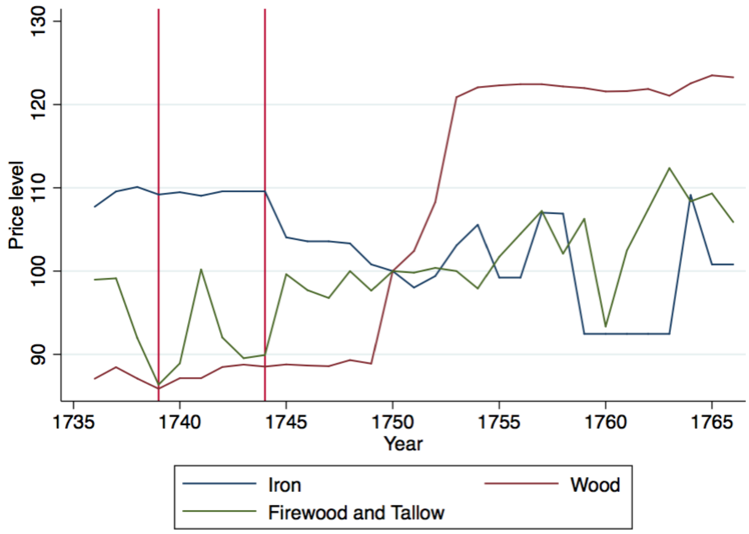

Figure 8.3: Group Indices for Iron, Wood, and Firewood and Tallow, 1750=100 (Historiske toll- og skipsanløpslister, 2017e)

8.2 The Period 1745–1755

In 1745, there was another sharp price shock, with prices rising until 1749. This is shown in table 8.2 and figure 8.4.

Table 8.2: Annual Inflation 1745–1755

Year	Inflation Rate
1745	12.27%
1746	5.08%
1747	0.56%
1748	9.18%
1749	6.96%
1750	–19.56%
1751	–4.50%
1752	–0.47%
1753	–1.29%
1754	–1.89%
1755	1.92%
Average Inflation	0.75%

Figure 8.4: Second Price Shock, 1750=100 (Historiske toll- og skipsanløpslister, 2017e)

This price shock is likely the result of the Second Silesian War of 1744–1745. Since there was severe deflation in 1744, the full impact of the war does not seem to hit Norway until the following year. While Norway was not an active participant, its economy still seemed to have been affected. Most likely, the war had an adverse effect on the number of imported commodities from countries participating in the war, which reduced supply, causing cost-push inflation. The war might also have led to an increased demand for Norwegian exports, causing demand-pull inflation as well.

While prices were increasing in 1745–1747, they did so at a decreasing rate, suggesting that the effect of the war was largest in its first year. Inflation started at 12.27% in 1745, but was down to 0.56% in 1747, indicating stabilization of the general price level. In 1750, there was severe deflation, which could be another sign that the economy was returning to a normal price level. This is evident in the price index, which rests right below a value of approximately 100 in the years 1750–1755. The price level for this period is also stable and low, with an average value rate of 0.75%.

8.3 The Period 1756–1761

Table 8.3 and figure 8.5 show the third price shock, which occurred in 1756, where inflation rose to almost 30%. We find that the average inflation rate here was twice as high as in the first period (1736–1744), and almost three times as high as the previous period (1745–1756).

Table 8.3: Annual Inflation: 1756–1761

Year	Inflation Rate
1756	29.71%
1757	5.17%
1758	6.19%
1759	–22.05%
1760	–1.81%
1761	–4.36%
Average Inflation	2.14%

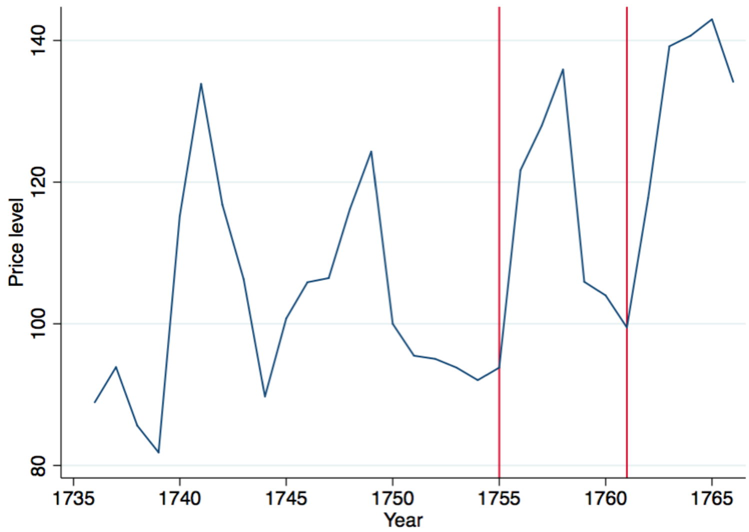

Figure 8.5: Third Price Shock, 1750=100 (Historiske toll- og skipsanløp-slister, 2017e)

The Seven Years' War likely caused the price shock. England's attacking and seizing of Norwegian ships probably made sea travel more dangerous, and consequently deterred trade. With less competition from international markets, supply decreased, which caused cost-push inflation. In 1756, Norway mobilized 13,000 troops, increasing government expenditure, which caused demand-pull inflation. Together, these shocks seem to have made a significant impact on prices. Also, as detailed in the History chapter, Kurantbanken increased their money supply in 1757 to finance the war. Here, we can apply quantity theory as an additional explanation for the shock. We argue that the increased money supply also led to inflation, thereby augmenting the price shock.

Whereas the economy reverted to normal levels after the previous price shocks, the third price shock seems to have caused a permanent upward shift in the price level. The severity of the situation is echoed by Qvigstad (2005, p. 20), who states that inflation at the start of the Seven Years' War was an international phenomenon. The economy seems to have reversed the shock from 1756, reflected by a deflation rate of –22.05% in 1759. However, as we will show with the fourth price shock, prices did not stabilize completely, indicating a positive long-run shift.

8.4 The Period 1762–1766

Table 8.4 and figure 8.6 show the fourth and last price shock, which can be explained by more troop mobilization, as well as increased use of the printing press.

Table 8.4: Annual Inflation 1762–1766

Year	Inflation Rate
1762	18.38%
1763	18.19%
1764	1.08%
1765	1.64%
1766	–6.17%
Average Inflation	6.62%

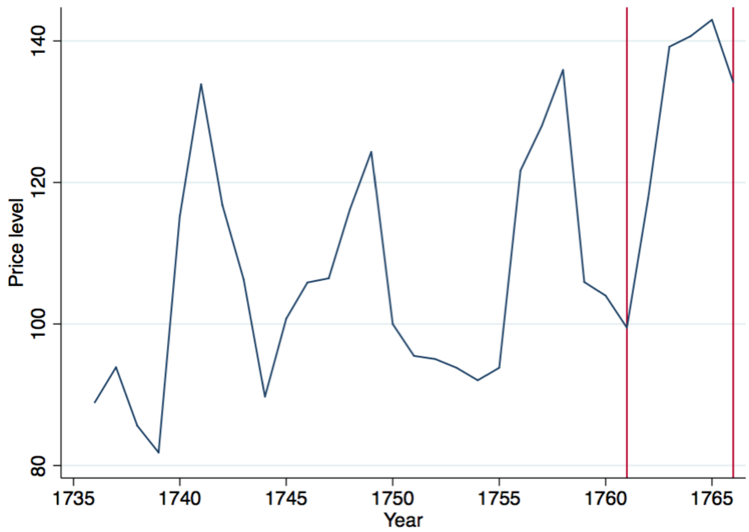

Figure 8.6: Fourth Price Shock, 1750=100 (Historiske toll- og skipsanløpslister, 2017e)

The shock occurred in 1762, causing an inflation rate of 18.38%. This continued into 1763, with a rate of 18.19%. Similar to the previous period, Norway mobilized troops in 1761, as a response to Peter the Third, who marched into Denmark to restore power over disputed land. Expenditure on defense and military seems to have resulted in demand-pull inflation in 1762.

In the fall of 1762, Heinrich Schimmelmann, on behalf of the government, imposed his tax to pay for the military expenditures. The collection of the tax was reasonably successful in 1763, but less so in the following years. However, the tax does not seem to have affected the price level to a large degree. In 1764, inflation was 1.08%, and in 1766, there was deflation, at –6.17%. As with previous periods, these rates speak in favor of the economy beginning to correct itself again. As noted by Qvigstad (2005, p. 18), both government expenditure and debt slowly began to decrease again in these years, which also decreased aggregate demand, explaining why the inflation rate fell in these years.

As explained earlier, we generally expect the price level to restore itself after a price shock, as shocks to demand or supply only affect inflation in the short run. However, the average inflation in the last two periods, with respective rates of 2.14% and 6.62%, were much higher than the first two periods, which indicates an upwards shift in the price level, and a positive price trend. This also pertained in the long run, if one looks at price levels from the 16th to 20th centuries (Grytten, 2004). We argue that that the long-run increase in prices was caused by Kurantbanken printing more banknotes to pay for the war, which increased the amount of money in circulation. This is in line with quantity theory, which claims that only an increase in the money supply can affect inflation in the long run.

8.5 The Producer Price Index

Figure 8.7 shows the producer price index. We first discuss the index's price shocks at the aggregate level, before decomposing it into its three groups, to better understand the main drivers of its price fluctuations.

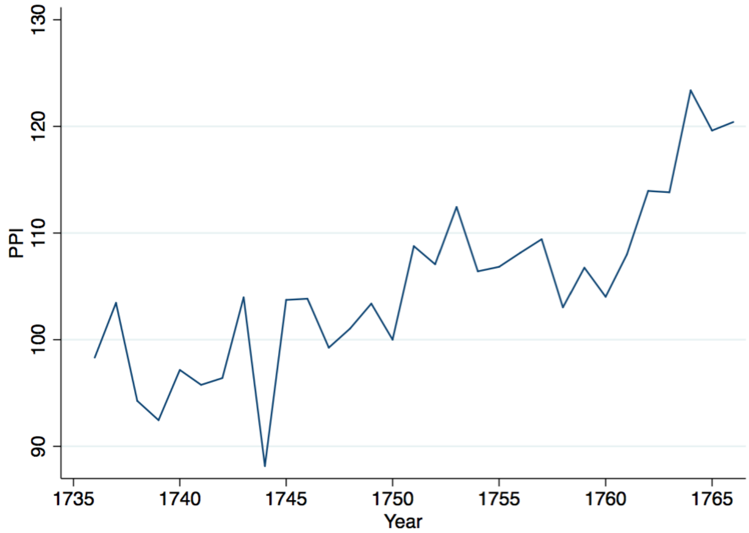

Figure 8.7: Producer Price Index, 1736–1766, 1750=100 (Historiske toll- og skipsanløpslister, 2017e)

We see a large negative shock in 1744, which coincides with the CLI and the WPI, though this does not mean that the same factors caused them. When we isolate the three groups in the index, as shown in figure 8.8, we see that the shock was caused by the price of fish falling, as the prices of wood and firewood and tallow were mostly stable in the 1740s.

Figure 8.8: Decomposition of the PPI, 1750=100 (Historiske toll- og skipsanløpslister, 2017e)

For the rest of the period, the PPI grows at a relatively steady rate. As seen in figure 8.8, a large part of that growth is caused by the price of wood rising sharply from the late 1740s to the early 50s. This price remains permanently high, which also explains why the PPI is higher in the second half of the period than in the first. The price of firewood and tallow also contributes to this, though not as much as wood. Meanwhile, in 1753, there is a negative dip in the PPI that lasts for seven years, before growth finally returns in 1760. This decrease is also caused by the price of fish falling. For the last six years, the PPI grows relatively quickly, save for a small dip in the final two years.

8.5.1 The Fishing Industry

Fish prices were rising up to the period of the famine and reached a peak in 1744. We argue that this increase was due to a substitution effect. As the supply of harvested food became more scarce during the famine, consumers might have looked for others sources for nutrition. As noted by Moseng et al. (2003, p. 272), people often used fishing as a secondary means of income, to support themselves in times when harvests were low. Therefore, it is reasonable to assume that the famine caused people to support themselves on fish instead of agriculture, which would increase the price of fish. As crop levels returned to normal, the demand for fish returned to normal levels, reducing its price, and causing a dip in the PPI.

The fall in prices for fish in 1751–1758 is likely due to an increased amount of fishing taking place during this time, as described by Moseng et al. (2003, p. 272). Consequently, the market was hit by a positive supply shock, decreasing prices. While the price of cod also fell in this period, the commodity indices show that it was primarily herring that drove the fall. From the late 50s and onward, prices rose again, most likely as a result of supply falling in this period, as detailed by Moseng et al. (2003, p. 271). The PPI mirrors this development.

8.5.2 The Wood Industry

The prices of the group firewood and tallow were mostly stable throughout the entire 31-year period, seemingly unaffected by the price shocks in the economy. Prices increased somewhat during the cold winter of 1739, but not dramatically. However, like the economy as a whole, firewood and tallow shows a slightly positive price trend in the long run. We believe that prices of various types of wood, such as planks, timber, and lumber follow each other relatively closely, since they often only vary according to their dimensions.

The price for wood rarely fluctuated and was stable in the period 1736–1752. Although we found that the regulatory effects of the Forestry Directorate were ineffective, we argue that prices could have been even higher between 1736–1746, had the regulations not been present in the market. However, there was a sharp increase in prices that began in 1749 and ended in 1754. The first part of this shock can be explained by the Forest Directory disbanding in 1746. The industry might have responded to their new freedom by raising prices, to align more with market demands. Christiania, Drammen, Fredrikstad, and Kristiansand had central roles in the industry (Sogner, 199. p. 139), and since the price series for wood in this thesis are from these cities, the effect of the Forest Directory disbanding is probably augmented in the price index.

The price of wood doubled from 1749 to 1753, largely driven by the price of small planks increasing. The first part of this price shock could have been a lagged effect of the Forest Directory disbanding, in which lumber tradesmen, farmers, and local officials resumed control in the industry. The second part could be explained by the restrictions imposed on lumber in 1752 (Coldevin, 1963, p. 309). Following a decree from the government, domestic transportation was severely limited, which probably had a negative effect on the supply, and prices consequently rose to reflect this limited availability. After the price shock, the wood prices remained relatively stable, even though several larger price shocks hit the economy as a whole. Although a second Forestry Directorate was established in 1760, its effect was also limited. Local officials, lumber dealers, and farmers played major roles in the industry, and so the Directorate probably had a harder time to fulfill their task of regulating prices.

8.6 Comparative Analysis

Here, we compare the new CLI with the old one for the same period, constructed by Grytten (2004). Additionally, we compare our CLI to similar indices from Sweden and Denmark. This will help put our index in perspective, as well as see to what extent our findings align or differ with related literature.

8.6.1 Grytten (2004) and Dhawan and Langdal (2018)

Figure 8.9 plots the new CLI along with Grytten (2004). Although the indices differ in many ways, they show fairly similar movements and have a correlation coefficient of 0.77. The similarity of the indices is a strong claim that they represent the true development of prices in Norway during the given period. Still, there are some differences, mainly that Grytten's index hovers above ours, and that the price movements are more erratic in comparison to ours. The price shocks shown in Grytten's index are also stronger, though they occur more rarely. Both indices capture the effects of the famine during the early 1740s, though Grytten's index seems to overestimate them somewhat. Meanwhile, the price level in our index increased during the Second Silesian War in the late 1740s, whereas Grytten's index remains stable. Finally, prices during the Seven Years' War is much higher in Grytten's index, and prices do not revert to old levels after the war's end. As we will show later, our index is generally more in line with price levels in Scandinavia in these years, indicating that our index captures the price effects of the war more reliably. For further details about these two indices, see Appendix F.3.

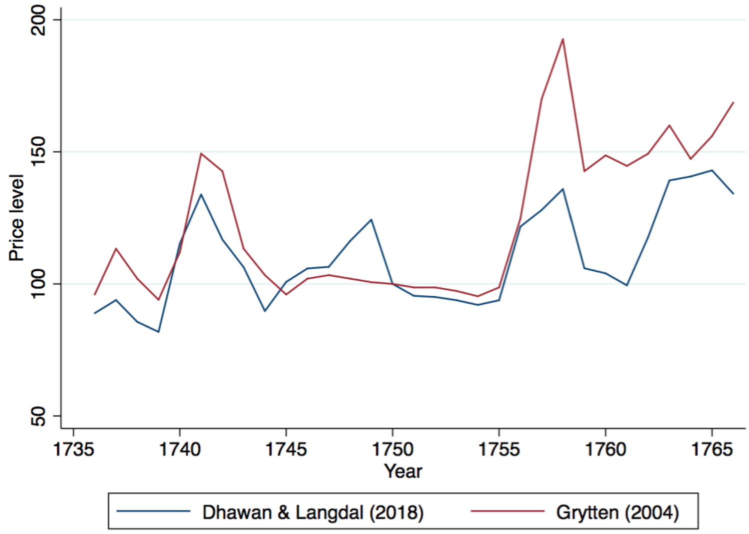

Figure 8.9: Comparison of New and Old CLI, 1750=100 (Historiske toll- og skipsanløpslister, 2017e; Norges Bank, 2006)

Figure 8.10 shows the inflation rates of the two indices. They have a correlation coefficient of 0.64, which is lower than the coefficient of the CLIs. We see that the inflation peaks are mostly at the same level, except in the mid-1760s. The rates follow each other closely, with only a few notable differences. Our CLI finds average yearly inflation of 2.21%, while Grytten (2004) calculates a per annum rate of 2.76%. This is an important finding, as it shows that the previous estimate of inflation was likely overstated. We also see that Grytten's index lags behind the peaks in ours. A possible explanation for the differences between the indices, can be that our index is based on more cities and commodities, and has more frequent price observations.

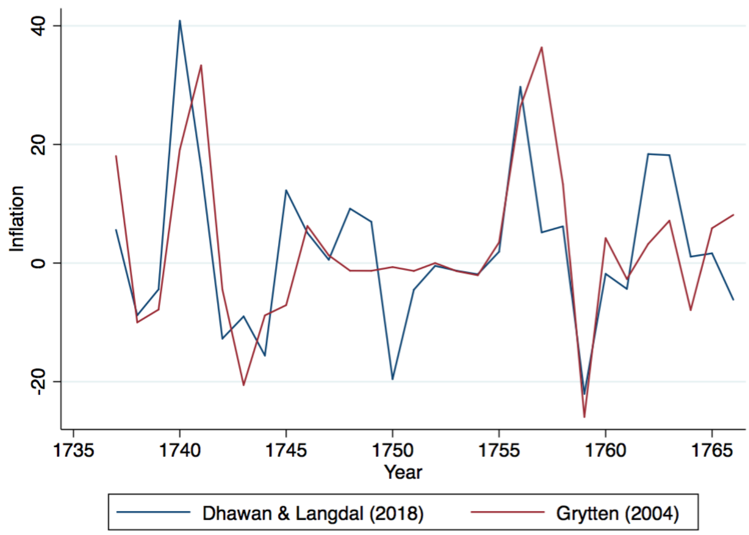

Figure 8.10: Comparison of Inflation Rates (Historiske toll- og skipsanløpslister, 2017e; Norges Bank, 2006)

8.6.2 Scandinavia

Figure 8.11 plots the two Norwegian CLIs with price indices for Denmark and Sweden. Our CLI and the Danish index has a correlation coefficient of 0.77, and our CLI and the Swedish have a coefficient of 0.72. While correlation is not a valid measure for internal validity, it is nonetheless interesting to note that the new price index aligns more closely with the indices of Sweden and Denmark than Grytten's index, which has a correlation coefficient of 0.74 with Denmark and 0.67 with Sweden. The high coefficients also make sense from an economic perspective, as the three countries traded frequently, and also experienced similar weather and conflict levels at the same time. See Appendices F and G for annual indices and inflation rates for the countries.

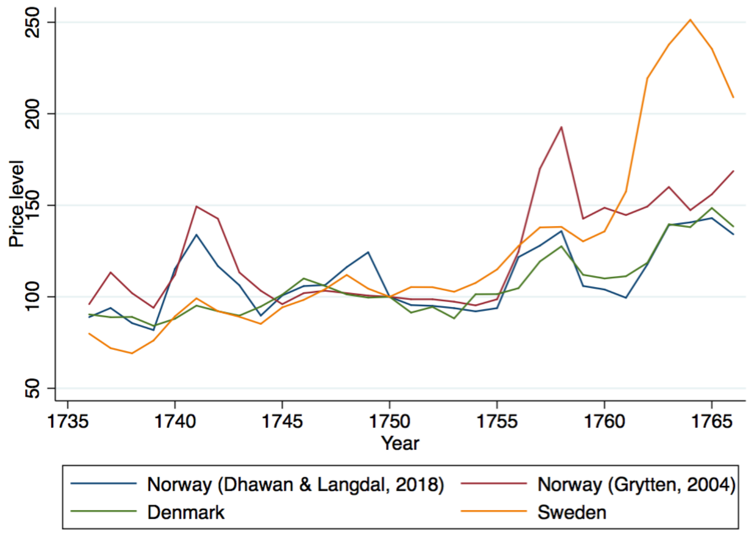

Figure 8.11: Comparison of the Revised Index and the Indices for Denmark and Sweden, 1750=100 (Danmarks Nationalbank, 2009; Norges Bank, 2006)

We see that the cold winters in 1739 and 1740 caused price shocks in 1740 and 1741 in all three countries. However, even though this shock is a bit smaller in our index than in Grytten's, there is still a noticeable difference between Norway and the two other countries. This is an argument in favor of the famine during this period being more severe for Norway. We also see that the end of price shock in the mid-1740s was stronger for Norway in our index, while Grytten's index is more in line with Denmark and Sweden. Earlier, we argued that the Second Silesian War could explain this shock. Sweden's inflation rate in 1745 was 11%, and Norway's was similar, at 12.3%. Denmark's shock was relatively more moderate, at 7%. However, Grytten (2004) finds that there was deflation in 1744 and 1745, which is counter-intuitive, as wars usually lead to export shocks or an increase in government spending. Our index, as well as Sweden and Denmark's, shows an inflationary shock, which is more in line with economic and historical findings.

We see that our index is higher than the three indices from 1747 to 1749. We find an inflation rate of almost 7% in 1749, whereas Grytten, Abildgren, and Edvinsson & Söderberg find deflation. There are two possible arguments for why our index deviates in this respect. One explanation is that the Norwegian economy took a long time to restore itself to normal levels following the war. However, since the war only lasted two years, and Norway's involvement was minimal, this is an unlikely reason. When we check group indices, we see that all groups except for iron, firewood and tallow and wood show positive growth from 1747 to 1749. Therefore, an alternative reason is that there was a climatic shock to agriculture that only affected Norway.

Lastly, when it comes to the Seven Years' war, which started in 1756, we see that our index is more aligned with Sweden and Denmark's than Grytten's, which has a much sharper price shock. The price levels in Grytten's index are higher than those in Sweden. This seems illogical, since Norway was a passive participant in the war, whereas Sweden was active. Since our index shows prices being lower in Norway than in Sweden, we argue that it better captures the actual price levels during the war. We see that all three countries experience a shock at the beginning of the war in 1756–1757, and another shock at the end of the war, in 1762–1763.

After 1760, prices soared in Sweden compared to Denmark and Norway, because of the war and also because of excessive supply of fiat money. This can be seen through abnormally high inflation rates: Sweden peaked at 39.3% in 1762, and Denmark also reached its maximum of 18% in 1763. Following the war, our index, as well as Abilgren and Edvinsson & Söderberg, show deflationary shocks in 1766, whereas Grytten finds inflation of 8%. As mentioned, short-term shocks often revert themselves, and we expect to see this to happen after the war had ended. Grytten's findings are therefore not in line with economic history or theory. In addition, Edvinsson (2009) finds that there were notable crop failures in Sweden in the years 1756–1757, 1762 and 1771–1772. This could also have been an essential contributor to the substantial spike.

8.7 Inflation Rates in Scandinavia

Figure 8.12 shows the inflation rates of our index, and Denmark and Sweden. We omit the inflation rate for Grytten (2004) for visual clarity. Since the explanations for the shocks are the same for both the price indices and the inflation rates, we do not repeat those arguments here. Still, there are some findings here that are worth pointing out. For instance, we see that erratic inflation was a common phenomenon and not exclusive to Norway, which is in line with Qvigstad (2005, p. 16), as he also finds the same for England. We see here that the same was true for Scandinavia.

However, while the three countries show similarities in the inflation rates, they differ in several aspects as well. We see that Norway usually had more pronounced inflation and deflation compared to the other two countries. For instance, Norway was hit the hardest by the extreme climatic shocks in 1739, although price levels in all three countries were affected. A possible explanation for this could be Norway's distinct geography, in particular its long coastline and mountains regions, which generally might make it more susceptible to frequent weather fluctuations. Meanwhile, Denmark had relatively stable inflation in the time period. A possible explanation for this might be that it is geographically closer to its trading partners, which likely lowered transport costs. Finally, as exemplified by Sweden, being an active participant in the war had a more severe effect on the price level than remaining passive.

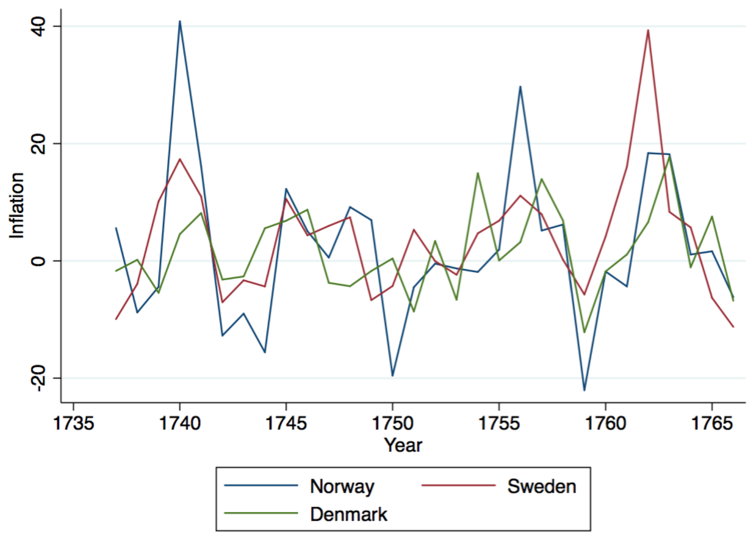

Figure 8.12: Comparison of Inflation Rates in Norway, Denmark and Sweden (Danmarks Nationalbank, 2009; Historiske toll- og skipsanløpslister, 2017e)

8.8 Summary

We find that the price shocks during the period 1736–1766 occurred for a variety of reasons, including crop failure, famine, and war. Moreover, while the economy was often affected by multiple events occurring concurrently, we see that specific events had a more substantial effect than others and that these events are reflected in the price index. We believe that, by showing how historical events in Norway can explain the various price shocks, we have strengthened the internal validity of the price indices.

9 Conclusions

9.1 Purpose

The purpose of this thesis has been to create and analyze three price indices for Norway during the period 1736–1766. Using newly published data on historical price currents, we have constructed a wholesale price index (WPI), a cost of living index (CLI), and a producer price index (PPI). We have used economic theory and history to explain the price developments of the indices and complemented our arguments with historical findings from the time period.

9.2 Data

The team *Historisk infrastruktur* gathered the prices we used to create our indices. This data on price currents is reliable and valid, as it collects prices on a monthly and yearly basis, and from multiple cities. In this thesis, we focused on five cities, specifically Arendal, Christiania, Drammen, Fredrikstad, and Kristiansand. The cities are representative of the Norwegian economy during the time period, due to their importance and contribution to major industries, such as agriculture, fishing, and wood.

9.3 Contribution to Literature

Price indices for this period have been created before, most notably by Grytten (2004). The data set in this thesis includes a total of 52 goods, as opposed to 18 goods in Grytten (2004). We have also included more cities, which makes our indices a better measurement of Norway's general price level. Usually, the previous literature on this topic is limited to just creating price indices or using them to explain their development. However, by complimenting our findings with an economic analysis, we not only strengthen the validity of our indices but also create a more integrated thesis.

9.4 Method

We used the Laspeyres index to compute the three indices, and we used findings from literature to allocate the weights. However, small adjustments were made to the weights, to compensate for certain limitations in the data. We interpolated goods with lacunae by using substitute goods with similar price trends. We interpolated prices of meat, fish, firewood, and wood the most. The remaining goods did not require more than a few adjustments. We ended up with a WPI that contains all 52 commodities, split into ten consumer groups; a CLI with 27 commodities, split into nine consumer groups; and a PPI with 36 commodities, split into three groups. To find inflation rates, we calculated yearly percentage changes in the CLI.

9.5 Findings

In Chapter 8.1, we explained the four price shocks in the period. We used economic theory on aggregate demand-aggregate supply to show how price shocks in the short run reverse, whereas shocks caused by the increased money supply, may push the general price level up in the long run.

We find that crop failure likely caused the first price shock in 1740. Consequently, the crop failure created a negative supply shock, which resulted in both high inflation and a famine that killed thousands. The second price shock was likely caused by the Second Silesian War, which led to falling imports from participating nations, and increased demand for Norwegian exports, especially wood products. The third shock in 1756 was a result of the Seven Years' War, where Norway mobilized troops and increased government expenditure, causing demand-pull inflation. In addition, an increase in the money supply, utilized to pay for the war, eventually caused a long-run increase in inflation. Finally, the fourth shock in 1762, and we argue that the cause of this was also increased government expenditure due to the war, which resulted in demand-pull inflation. Due to excessive use of the printing press to finance state debt, the price level following the last two shocks did not revert in the same way compared to the first two shocks.

In Chapter 8.5, we analyzed the price changes in the PPI, decomposing it into its three groups—fish, wood, and firewood and tallow—to better detail its development. We found that the PPI increased during the famine, as consumers substituted harvested commodities for fish. When crops returned to normal, the demand for price fell again, causing a negative shock to the PPI. During the rest of the period, the PPI grew steadily, which was mainly driven by the price of both wood and firewood and tallow rising. There was a small dip in prices during the 1750s, which likely was caused by the price of fish falling, possibly due to increased supply. However in 1760s, a decreased supply of fish caused prices to rise again.

Lastly, in Chapter 8.6, we compared our CLI with Grytten (2004), Edvinsson & Söderberg (2011) and Abildgren (2010). During the years of the famine, we found that Grytten's index overstates the price level somewhat, compared to our index. However, we still found that the price level in Norway was higher than Denmark and Sweden during these years, perhaps because Norway's geography is relatively more prone to weather shocks. We also found that the Second Silesian War (1744–1745) affected the general price levels in Denmark and Sweden. However, Grytten found deflation in both years, suggesting that his index did not capture the economic consequences of the war. For the Seven Years' War, Grytten's index predicted a higher price level than Sweden, while our index predicted a lower price level than Sweden. His finding is counter-intuitive, as Sweden was an active participant in the war, while Denmark-Norway focused on armed neutrality. Furthermore, Sweden's price level was impacted by excessive use of the fiat standard, causing even higher inflation. Therefore, we argued that our index better captures the true price level during the Seven Years' War. On a larger level, we found that erratic inflation was common in all three countries during the entire period, suggesting this was not a phenomenon exclusive to Norway.

9.6 Further Research

We hope our indices will contribute to future research on Norwegian economic history, whereby different approaches can be taken. The most relevant first step would be using our indices to splice them with Grytten (2004), which would supplement and improve his findings for the 18th century. Furthermore, Historisk infrastruktur has two databases on Trondheim's copper exports from 1753–1793, which would be valuable to include in the current PPI.

There are also detailed price currents from major cities such as Bergen, Christiania, and Drammen that span from the end of the 18th century to the end of the 19th century. Using these price currents to construct indices would be especially relevant in the context of Klovland (2013), and could also be spliced with existing indices. There is no doubt that Grytten (2004) and Klovland (2013) are essential works that have set a high standard for future work. Previous findings can be improved with the availability of new data. Historisk infrastruktur has also published data on ship traffic lists from the mid 18th century to early 19th century. This data could help provide information on Norway's export and maritime industry and its development domestically and internationally.

Appendices

The Appendices are structured as follows:

- Appendix A: General Composition of Groups
- Appendix B: Unweighted Commodity Indices
- Appendix C: Wholesale Price Index
- Appendix D: Cost of Living Index
- Appendix E: Producer Price Index
- Appendix F: Aggregate Indices (WPI, CLI, PPI) and Inflation Rates. Grytten (2004) is also tabulated here (Norges Bank, 2006)
- Appendix G: Indices from Sweden and Denmark (Danmarks Nationalbank, 2009)
- Appendix H: Excluded Commodities
- Appendix I: Interpolations

Appendix A presents the commodities and their respective weights within their group. Later, we only present adjusted group weights for the WPI, CLI and PPI.

Appendix B presents the unweighted commodity indices. These are always identical, regardless of the index they are used in.

The raw data (price series) of Appendices A–E are taken from Historiske toll- og skipsanløplister (2017e). We have used these price series to construct revised indices for the period 1736–1766, and the final results of the following pages are therefore our own work, unless we refer to other sources. For wood and firewood and tallow, a foot (ft) denotes an older measurement, where one foot = 0.31m.

Appendix H shows which commodities were excluded in our index. These commodities had too few observations or were inconsistently named. The total number of excluded commodities is 92. To avoid duplication, we have only listed the name of each excluded commodity once, because there were still too few observations, even if they might have appeared in another city. The original name is written if we did not find a suitable translation in English.

Appendix I shows which commodities and for what years interpolation was used.

A General Composition of Groups

Table A.1: Composition of Groups (Part 1/2)

Groups and Commodities	**Weight (%)**
1. Grains	
Wheat	15.0
Rye	20.0
Oats	32.5
Barley, Grain	32.5
2. Groats	
Cereal	25.0
Barley, Groats	25.0
Rolled Oats	30.0
Buckwheat	20.0
3. Vegetables	
Peas	100.0
4. Dairy Products	
Cheese	40.0
Butter	60.0
5. Meat	
Meat (salted)	50.0
Pork	50.0
6. Iron	
Iron	50.0
Iron rod	50.0
7. Drinks	
Malt	100.0
8. Fish	
Cod (Stockfish)	75.0
Herring (Salted)	25.0

Table A.2: Composition of Groups (Part 2/2)

Groups, Commodities and Sub-groups			**Weight (%)**
9. Wood	Length (ft.)	Height (in.)	
Sub-group: Small Planks			
Pine	11–12	2.5	4
Pine	9–10	1.25–1.5	4
Pine	10–12	2.5	4
Pine	12	1.5	4
Pine	9–10	1.25	4
Pine	9	1.25	4
Pine	10–12	1.25	4
Spruce	10–11	2.5	4
Spruce	9–10	1.25–1.5	4
Spruce	9–10	2.5	4
Spruce	10–12	2.5	4
Spruce	11–12	2.5	4
Sub-group: Planks			
Pine	12	1.5	4
Pine	12	1.25	4
Pine	10	1.25	4
Pine	9–10	1.5	4
Pine (type: lumber)	9–10	1.5	4
Pine	10	2.0	4
Pine (type: lumber)	10	2.0	4
Spruce	12	1.5	4
Spruce	9	1.5	4
Spruce	10	2.0	4
Spruce (type: lumber)	10	2.0	4
Spruce (type: lumber)	9–10	1.5	4
Spruce (type: lumber)	12	1.5	4
10. Firewood and Tallow			
Sub-group: Planks			
Substandard quality	12		6.25
Substandard quality	10		6.25
Scraps	12		6.25
Scraps	10		6.25
Pine scraps	9–10	1.5	6.25
Pine scraps	10	2.0	6.25
Spruce scraps	10	2.0	6.25
Spruce scraps	9–10	1.5	6.25
Sub-group: Tallow			50

B Unweighted Commodity Indices

Table B.1: Commodity Indices for Group 1

Group	1. Grain			
Commodity	Wheat	Rye	Oats	Barley
Year				
1736	107.57	110.21	74.93	102.68
1737	108.53	114.11	97.98	117.29
1738	86.02	87.09	80.50	98.81
1739	82.17	81.71	79.73	88.97
1740	142.69	141.55	125.36	149.78
1741	159.51	164.72	159.85	194.19
1742	115.63	127.95	129.30	159.91
1743	96.79	105.85	108.93	126.83
1744	92.94	89.69	83.00	95.08
1745	105.38	93.31	98.46	99.11
1746	114.49	112.53	99.81	111.33
1747	107.83	118.29	101.44	127.87
1748	115.45	132.13	136.50	149.48
1749	125.09	138.81	152.83	170.19
1750	100.00	100.00	100.00	100.00
1751	84.93	75.21	88.28	92.85
1752	89.17	80.55	80.21	104.88
1753	84.18	73.82	86.94	104.88
1754	84.44	81.94	85.25	101.34
1755	93.38	100.97	91.98	97.62
1756	113.88	150.88	168.11	100.60
1757	144.29	157.20	170.80	192.55
1758	166.29	172.52	176.95	203.43
1759	118.08	119.78	123.92	127.42
1760	117.20	93.43	101.59	138.60
1761	102.05	90.18	103.99	113.08
1762	139.19	149.37	135.69	149.22
1763	149.00	161.10	215.66	207.34
1764	145.23	141.60	149.66	197.76
1765	160.76	152.65	163.50	199.70
1766	147.30	140.20	146.59	171.54

Table B.2: Commodity Indices for Group 2

Group	2. Groats			
Commodity	Cereal	Barley	Rolled Oats	Buckwheat
Year				
1736	63.94	70.00	81.68	80.97
1737	61.88	67.75	77.56	78.78
1738	49.71	80.97	79.70	84.08
1739	41.26	77.87	75.08	74.86
1740	82.51	125.39	106.93	115.46
1741	94.89	127.08	132.51	133.79
1742	82.51	116.07	108.42	106.23
1743	82.51	108.61	88.45	109.00
1744	80.52	105.99	75.58	103.46
1745	91.33	120.22	78.05	107.96
1746	89.23	117.45	82.34	111.42
1747	83.25	109.59	91.58	114.53
1748	82.51	122.17	99.01	121.22
1749	113.45	125.28	101.49	133.22
1750	100.00	100.00	100.00	100.00
1751	98.38	85.84	93.56	103.34
1752	104.24	88.31	99.01	80.74
1753	107.02	84.49	96.70	78.43
1754	98.11	82.25	99.67	74.74
1755	95.74	85.39	101.65	82.58
1756	107.72	134.83	160.50	130.40
1757	136.29	119.85	125.08	123.64
1758	133.10	121.50	142.74	131.03
1759	90.97	87.75	87.46	98.73
1760	95.51	95.17	99.01	105.88
1761	93.24	98.43	80.53	107.73
1762	109.12	116.10	72.94	115.34
1763	135.53	138.99	49.50	104.04
1764	134.29	127.98	93.56	118.45
1765	132.64	130.19	118.32	115.34
1766	108.50	124.49	119.64	88.24

Table B.3: Commodity Indices for Groups 3–5

Group	3. Vegetables	4. Dairy Products		5. Meat	
Commodity	Peas	Cheese	Butter	Pork	Meat (salted)
Year					
1736	111.30	43.43	70.15	65.64	81.36
1737	102.17	47.31	77.33	69.40	86.02
1738	97.83	51.29	75.03	64.56	80.02
1739	90.87	48.41	78.06	71.54	73.86
1740	154.13	71.20	94.89	98.49	98.49
1741	182.03	83.78	126.84	119.17	119.17
1742	137.97	68.58	109.14	121.88	121.88
1743	111.30	70.11	91.72	106.58	106.58
1744	94.64	63.26	79.36	88.10	88.10
1745	98.12	80.84	106.76	93.09	93.09
1746	101.74	94.02	101.31	105.52	105.52
1747	125.22	94.64	93.67	95.09	95.09
1748	128.12	101.90	101.18	105.40	105.40
1749	142.75	103.74	101.42	106.23	106.23
1750	100.00	100.00	100.00	100.00	100.00
1751	88.91	84.56	90.57	98.62	98.62
1752	93.19	80.67	98.93	86.66	86.66
1753	88.70	82.25	96.47	81.48	81.48
1754	85.65	75.78	94.19	94.29	94.29
1755	89.42	72.28	96.36	96.85	96.85
1756	130.43	80.53	107.36	117.19	117.19
1757	139.57	84.88	100.08	105.04	110.80
1758	161.96	83.40	103.36	119.00	155.54
1759	116.38	61.55	105.08	107.74	140.82
1760	112.90	56.99	98.42	106.91	139.74
1761	104.49	55.94	100.80	100.61	131.50
1762	131.30	67.52	118.58	108.19	141.41
1763	181.45	82.51	134.21	127.07	166.09
1764	169.24	103.44	132.46	142.69	196.97
1765	155.11	104.61	136.80	147.33	196.97
1766	139.24	97.32	144.64	134.80	196.97

Table B.4: Commodity Indices for Groups 6–8

Group	6. Iron		7. Drinks	8. Fish	
Commodity	Iron	Iron Rod	Malt	Cod	Herring
Year					
1736	108.04	107.41	101.71	109.14	120.75
1737	108.04	111.07	111.52	129.87	107.82
1738	108.04	112.15	98.86	109.14	90.07
1739	108.04	110.33	87.06	109.14	87.51
1740	108.04	110.89	144.24	109.14	127.85
1741	106.96	111.11	180.09	100.04	117.20
1742	108.04	111.11	153.34	109.14	106.54
1743	108.04	111.11	128.02	130.96	127.85
1744	108.04	111.11	102.99	87.31	85.24
1745	97.00	111.11	97.30	123.32	127.85
1746	96.04	111.11	114.37	123.32	133.54
1747	96.04	111.11	130.73	116.23	106.54
1748	96.04	110.61	147.80	116.23	116.23
1749	96.04	105.56	164.15	124.35	124.35
1750	100.00	100.00	100.00	100.00	100.00
1751	96.04	100.00	89.62	121.20	121.20
1752	98.80	100.00	106.51	108.90	108.90
1753	102.46	103.70	104.20	108.12	108.12
1754	100.00	111.11	100.28	91.10	91.10
1755	98.44	100.00	96.37	90.05	90.05
1756	98.44	100.00	177.81	92.15	92.15
1757	114.05	100.00	177.81	94.24	94.24
1758	113.81	100.00	197.58	79.58	79.58
1759	96.04	88.89	129.62	87.96	87.96
1760	96.04	88.89	135.85	87.43	87.43
1761	96.04	88.89	112.73	93.72	93.72
1762	96.04	88.89	147.94	107.33	107.33
1763	96.04	88.89	197.37	105.50	105.50
1764	96.04	122.22	175.39	131.94	131.94
1765	96.04	105.56	190.47	119.90	119.90
1766	96.04	105.56	173.12	124.08	124.08

Table B.5: Commodity Indices for Group 9 (Part 1/6)

Group	9. Wood (Sub-group: Small Planks, Pine)						
Length (ft)	11–12	9–10	10–12	12	9–10	9	10–12
Height (in)	2.5	1.25–1.5	2.5	1.5	1.25	1.25	1.25
Year							
1736	75.00	85.71	85.71	100.00	62.35	62.35	54.57
1737	75.00	85.71	85.71	100.00	62.35	62.35	54.57
1738	75.00	85.71	85.71	100.00	62.35	62.35	54.57
1739	75.00	85.71	85.71	100.00	50.66	50.66	44.34
1740	75.00	85.71	85.71	100.00	50.66	50.66	44.34
1741	75.00	85.71	85.71	100.00	50.66	50.66	44.34
1742	75.00	85.71	85.71	100.00	62.35	62.35	54.57
1743	75.00	85.71	85.71	100.00	64.30	64.30	57.87
1744	75.00	85.71	85.71	100.00	62.35	62.35	55.83
1745	75.00	85.71	85.71	100.00	65.08	65.08	60.10
1746	75.00	85.71	85.71	100.00	63.91	63.91	60.10
1747	75.00	85.71	85.71	100.00	62.35	62.35	57.09
1748	75.00	85.71	85.71	100.00	65.78	65.78	68.39
1749	75.00	85.71	85.71	100.00	62.35	62.35	64.72
1750	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1751	95.88	100.00	100.00	100.00	128.99	128.99	117.43
1752	107.50	103.71	100.00	100.00	140.30	140.30	120.19
1753	125.00	114.29	110.19	100.00	147.39	147.39	124.70
1754	125.00	114.29	125.00	100.00	150.19	150.19	133.83
1755	125.00	114.29	125.00	100.00	150.19	150.19	139.78
1756	125.00	114.29	125.00	100.00	150.19	155.14	138.22
1757	125.00	114.29	125.00	100.00	150.19	155.14	138.22
1758	125.00	114.29	125.00	100.00	150.19	155.14	138.22
1759	125.00	114.29	125.00	100.00	145.12	149.90	137.08
1760	125.00	114.29	125.00	100.00	143.04	147.76	131.07
1761	125.00	114.29	125.00	100.00	143.04	147.76	132.21
1762	145.88	114.29	125.00	100.00	137.96	142.51	127.94
1763	125.00	114.29	125.00	100.00	138.25	142.81	128.19
1764	125.00	114.29	125.00	100.00	149.48	154.41	142.31
1765	125.00	114.29	125.00	100.00	157.35	162.53	150.24
1766	125.00	105.71	125.00	100.00	157.35	162.53	149.70

Table B.6: Commodity Indices for Group 9 (Part 2/6)

Group	9. Wood (Sub-group: Small Planks, Pine)				
Length (ft)	11–12	10–11	9–10	9–10	10–12
Height (in)	2.5	2.5	1.25-1.5	2.5	2.5
Year					
1736	75.00	75.00	83.33	76.53	76.53
1737	75.00	75.00	84.67	93.11	93.11
1738	75.00	75.00	83.33	76.53	76.53
1739	75.00	75.00	83.33	76.53	76.53
1740	75.00	75.00	83.33	76.53	76.53
1741	75.00	75.00	83.33	76.53	76.53
1742	75.00	75.00	83.33	76.53	76.53
1743	75.00	75.00	83.33	76.53	76.53
1744	75.00	75.00	83.33	76.53	76.53
1745	75.00	75.00	83.33	76.53	76.53
1746	75.00	75.00	83.33	76.53	76.53
1747	75.00	75.00	83.33	76.53	76.53
1748	75.00	75.00	83.33	76.53	76.53
1749	75.00	75.00	83.33	76.53	76.53
1750	100.00	100.00	100.00	100.00	100.00
1751	99.00	99.00	100.00	102.04	88.89
1752	140.00	140.00	100.00	114.80	100.00
1753	200.00	200.00	100.00	153.06	200.00
1754	200.00	200.00	100.00	153.06	200.00
1755	200.00	200.00	100.00	153.06	200.00
1756	200.00	200.00	100.00	153.06	200.00
1757	200.00	200.00	100.00	153.06	200.00
1758	200.00	200.00	100.00	153.06	200.00
1759	200.00	200.00	100.00	153.06	200.00
1760	200.00	200.00	100.00	153.06	200.00
1761	200.00	200.00	100.00	153.06	200.00
1762	200.00	200.00	100.00	153.06	200.00
1763	200.00	200.00	100.00	153.06	200.00
1764	200.00	200.00	100.00	153.06	200.00
1765	200.00	200.00	100.00	153.06	200.00
1766	200.00	200.00	103.33	153.06	200.00

Table B.7: Commodity Indices for Group 9 (Part 3/6)

Note that Lumber is an additional specification that only concerns the last three columns that still falls under the same sub-group. This also regards the next three tables.

Group	9. Wood (Sub-group: Planks, Spruce, 1736–1749)					
				Lumber	Lumber	Lumber
Length (ft)	12	9–10	10	9–10	10	12
Height (in)	1.5	1.5	2	1.5	2	1.5
Year						
1736	100.00	100.00	100.00	100.00	100.00	100.00
1737	100.00	100.00	100.00	100.00	100.00	100.00
1738	100.00	100.00	100.00	100.53	100.00	100.00
1739	100.00	100.00	100.00	100.00	100.00	100.00
1740	100.00	100.00	100.00	100.00	100.00	100.00
1741	100.00	100.00	100.00	100.00	100.00	100.00
1742	100.00	100.00	100.00	100.00	100.00	100.00
1743	100.00	100.00	100.00	100.00	100.00	100.00
1744	100.00	100.00	100.00	100.00	100.00	100.00
1745	100.00	100.00	97.86	100.00	98.74	100.00
1746	100.00	100.00	100.00	100.00	100.00	100.00
1747	100.00	100.00	100.00	100.00	100.00	100.00
1748	100.00	100.00	100.00	100.00	100.00	100.00
1749	100.00	100.00	100.00	100.00	100.00	100.00

Table B.8: Commodity Indices for Group 9 (Part 4/6)

Group	9. Wood (Sub-group: Planks, Spruce, 1750–1766)					
				Lumber	Lumber	Lumber
Length (ft)	12	9–10	10	9–10	10	12
Height (in)	1.5	1.5	2	1.5	2	1.5
Year						
1750	100.00	100.00	100.00	100.00	100.00	100.00
1751	100.00	100.00	100.00	100.00	100.00	100.00
1752	100.00	100.00	100.00	100.00	100.00	100.00
1753	100.00	100.00	100.00	100.00	100.00	100.00
1754	100.00	100.00	100.00	100.00	100.00	100.00
1755	100.00	100.00	100.00	100.00	100.00	100.00
1756	100.00	100.00	100.00	100.00	100.00	100.00
1757	100.00	100.00	100.00	100.00	100.00	100.00
1758	100.00	100.00	100.00	93.33	100.00	100.00
1759	100.00	100.00	100.00	100.00	100.00	100.00
1760	100.00	100.00	100.00	100.00	100.00	100.00
1761	100.00	100.00	100.00	100.00	100.00	100.00
1762	100.00	100.00	100.00	100.00	100.00	100.00
1763	100.00	100.00	100.00	100.00	100.00	100.00
1764	100.00	100.00	100.00	100.00	100.00	100.00
1765	100.00	100.00	100.00	100.00	100.00	100.00
1766	100.00	100.00	100.00	100.00	100.00	100.00

Table B.9: Commodity Indices for Group 9 (Part 5/6)

Group	9. Wood (Sub-group: Planks, Pine, 1736–1749)						
						Lumber	Lumber
Length (ft)	12	12	10	10	9–10	9–10	10
Height (in)	1.5	1.25	1.25	2	1.5	1.5	2
Year							
1736	73.40	91.43	100.00	100.00	100.00	100.00	100.00
1737	73.40	91.43	100.00	100.00	100.00	100.00	100.00
1738	73.40	91.43	100.00	100.00	100.00	100.00	100.00
1739	73.40	91.43	103.50	100.00	100.00	100.00	100.00
1740	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1741	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1742	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1743	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1744	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1745	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1746	100.00	100.00	100.00	100.00	100.00	100.00	95.74
1747	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1748	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1749	100.00	100.11	100.00	100.00	100.00	100.00	100.00

Table B.10: Commodity Indices for Group 9 (Part 6/6)

Group	9. Wood (Sub-group: Planks, Pine, 1750–1766)						
						Lumber	Lumber
Length (ft)	12	12	10	10	9–10	9–10	10
Height (in)	1.5	1.25	1.25	2	1.5	1.5	2
Year							
1750	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1751	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1752	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1753	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1754	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1755	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1756	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1757	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1758	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1759	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1760	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1761	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1762	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1763	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1764	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1765	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1766	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table B.11: Commodity Indices for Group 10 (Part 1/2)

Substandard quality and scraps are additional specifications that still fall under the same sub-group.

Group	10. Firewood & Tallow (Sub-group: Planks)			
	Substandard quality		Scraps	
Length (ft)	12	10	12	10
Year				
1736	90.91	88.89	85.71	80.00
1737	90.91	88.89	85.71	80.00
1738	90.91	88.89	85.71	80.00
1739	90.91	88.89	85.71	80.00
1740	100.00	100.00	100.00	90.00
1741	100.00	100.00	100.00	100.00
1742	100.00	100.00	100.00	100.00
1743	100.00	100.00	100.00	100.00
1744	100.00	100.00	100.00	100.00
1745	100.00	100.00	100.00	100.00
1746	100.00	100.00	100.00	100.00
1747	100.00	100.00	100.00	100.00
1748	100.00	100.00	100.00	100.00
1749	100.00	100.00	100.00	100.00
1750	100.00	100.00	100.00	100.00
1751	100.00	100.00	100.00	100.00
1752	100.00	100.00	100.00	100.00
1753	100.00	100.00	100.00	100.00
1754	100.00	100.00	100.00	100.00
1755	100.00	100.00	100.00	100.00
1756	100.00	100.00	100.00	100.00
1757	100.00	100.00	100.00	100.00
1758	100.00	100.00	100.00	100.00
1759	100.00	100.00	100.00	100.00
1760	100.00	100.00	100.00	100.00
1761	100.00	100.00	100.00	100.00
1762	100.00	100.00	100.00	100.00
1763	100.00	100.00	100.00	100.00
1764	100.00	100.00	100.00	100.00
1765	100.00	100.00	100.00	100.00
1766	100.00	100.00	100.00	100.00

Table B.12: Commodity Indices for Group 10: Firewood and Tallow (Part 2/2)

Group	10. Firewood & Tallow (Sub-groups: Planks and Tallow)				
	Scraps (Spruce)		Scraps (Pine)		Tallow
Length (ft)	9–10	10	9–10	10	
Height (in)	1.5	2	1.5	2	
Year					
1736	100.00	100.00	100.00	100.00	104.74
1737	100.00	100.00	100.00	100.00	105.07
1738	100.00	100.00	100.00	100.00	90.75
1739	103.50	100.00	100.00	100.00	79.09
1740	100.00	100.00	100.00	100.00	79.09
1741	100.00	100.00	100.00	100.00	100.38
1742	100.00	100.00	100.00	100.00	84.03
1743	100.00	100.00	100.00	100.00	79.09
1744	100.00	100.00	100.00	100.00	79.85
1745	100.00	100.00	100.00	100.00	99.24
1746	100.00	100.00	100.00	109.07	94.30
1747	100.00	100.00	100.00	100.00	93.54
1748	100.00	100.00	100.00	100.00	100.00
1749	102.00	100.00	100.00	100.00	95.06
1750	100.00	100.00	100.00	100.00	100.00
1751	100.00	100.00	100.00	100.00	99.62
1752	100.00	100.00	100.00	100.00	100.76
1753	100.00	100.00	100.00	100.00	100.00
1754	100.00	100.00	100.00	100.00	95.82
1755	100.00	100.00	100.00	100.00	103.42
1756	100.00	100.00	100.00	100.00	108.94
1757	100.00	100.00	100.00	100.00	114.45
1758	100.00	100.00	100.00	100.00	104.18
1759	100.00	100.00	100.00	100.00	112.55
1760	100.00	100.00	100.00	100.00	86.69
1761	100.00	100.00	100.00	100.00	104.94
1762	100.00	100.00	100.00	100.00	114.83
1763	100.00	100.00	100.00	100.00	124.71
1764	100.00	100.00	100.00	100.00	116.73
1765	100.00	100.00	100.00	100.00	118.63
1766	100.00	100.00	100.00	100.00	111.79

B.1 Graphs

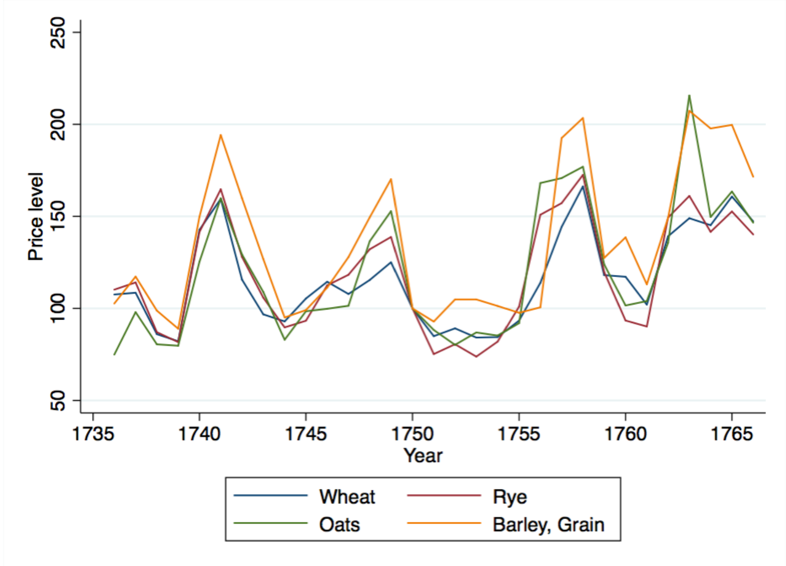

Figure B.1: Grain

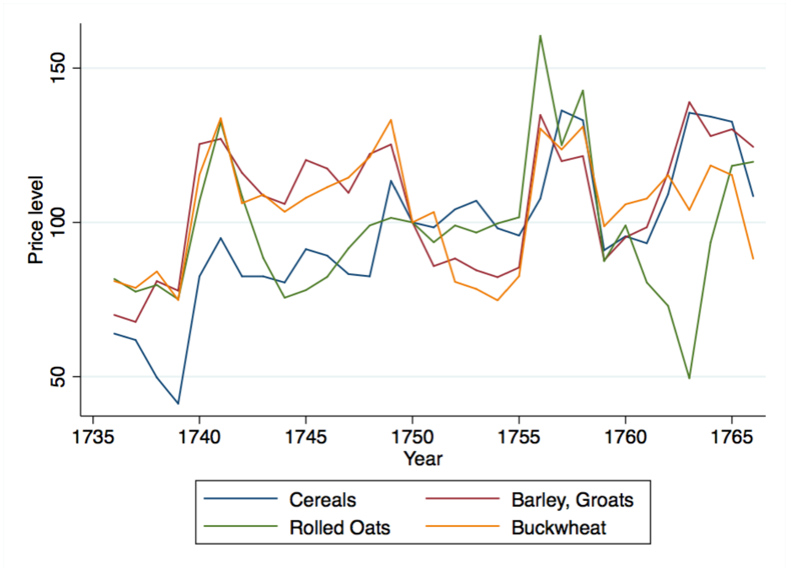

Figure B.2: Groats

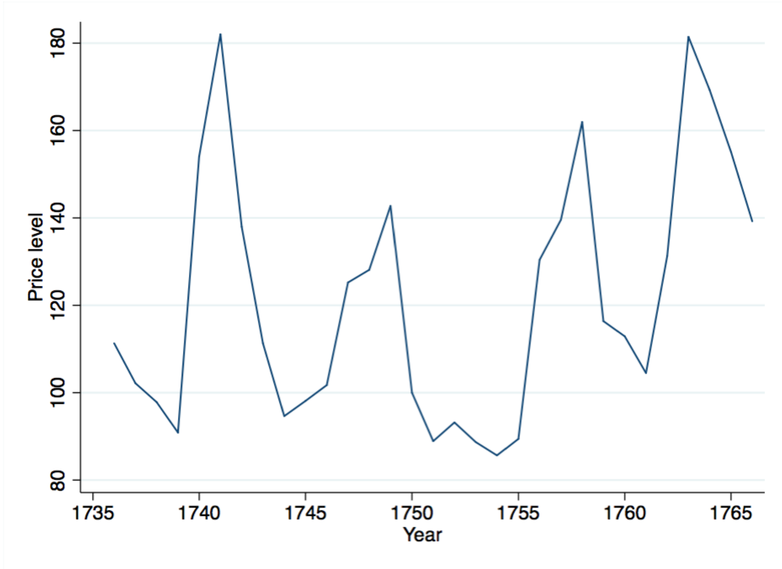

Figure B.3: Vegetables (Peas)

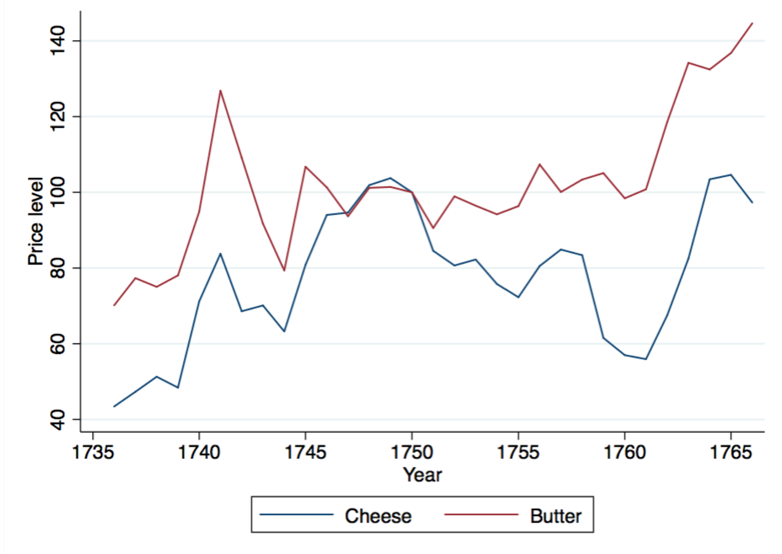

Figure B.4: Dairy Products

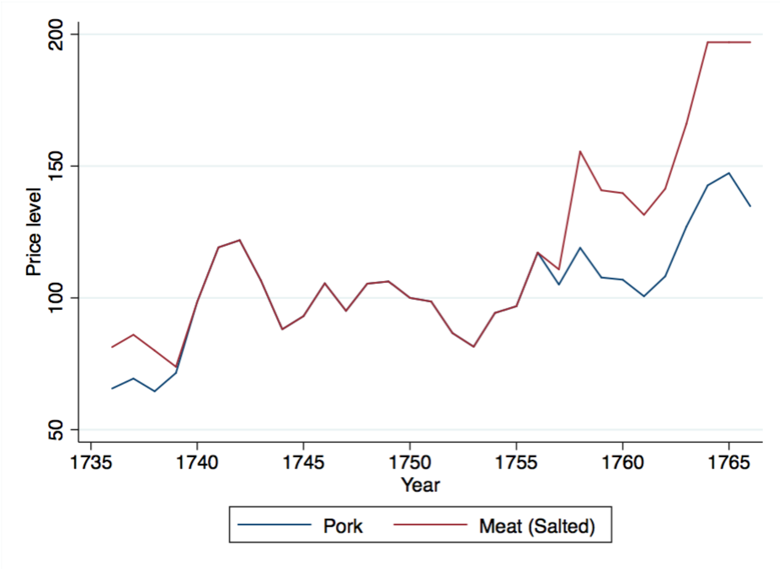

Figure B.5: Meat

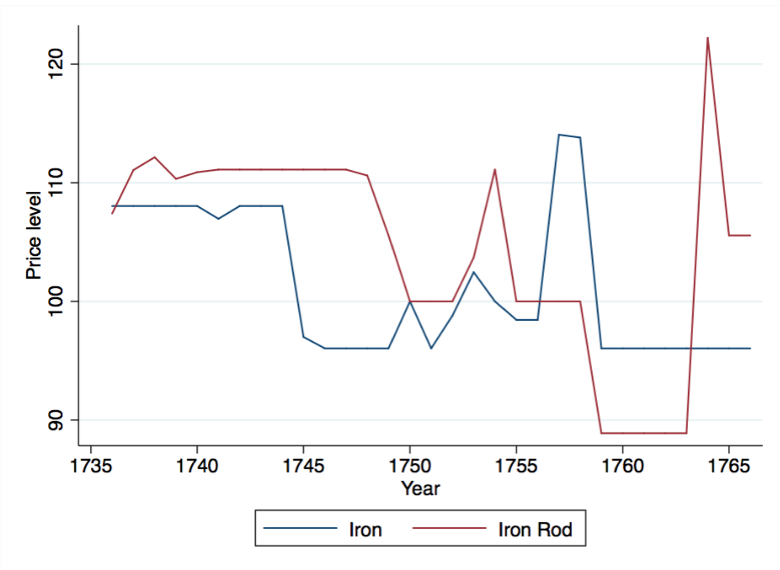

Figure B.6: Iron

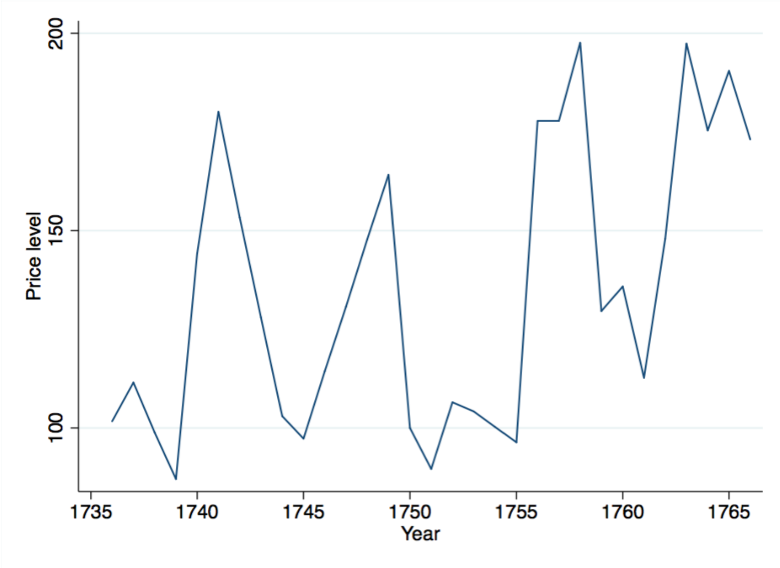

Figure B.7: Drinks (Malt)

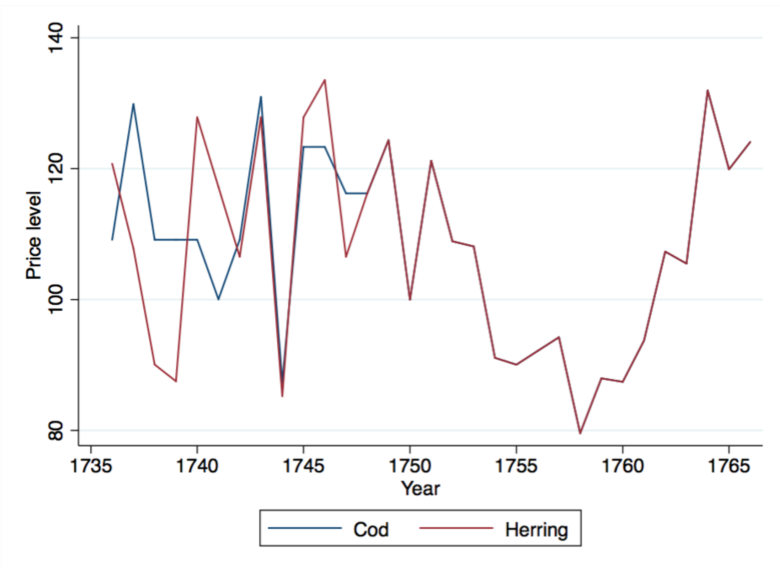

Figure B.8: Fish

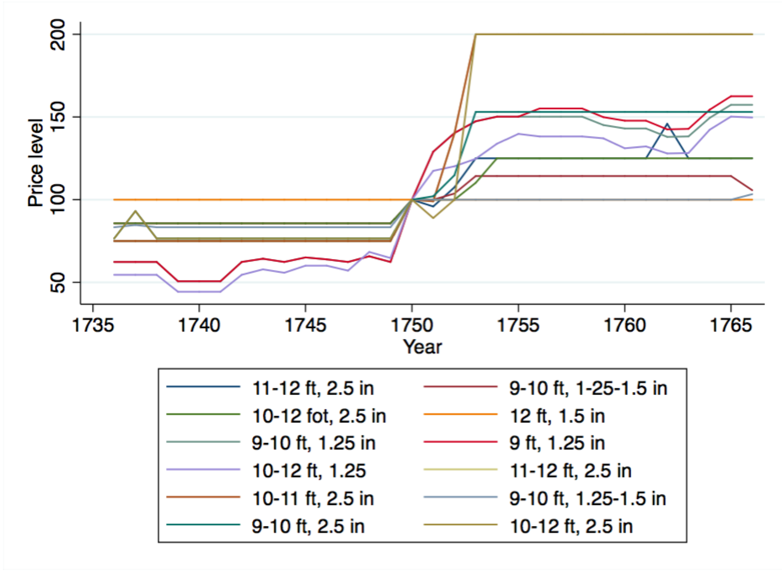

Figure B.9: Wood (Small Planks, Pine)

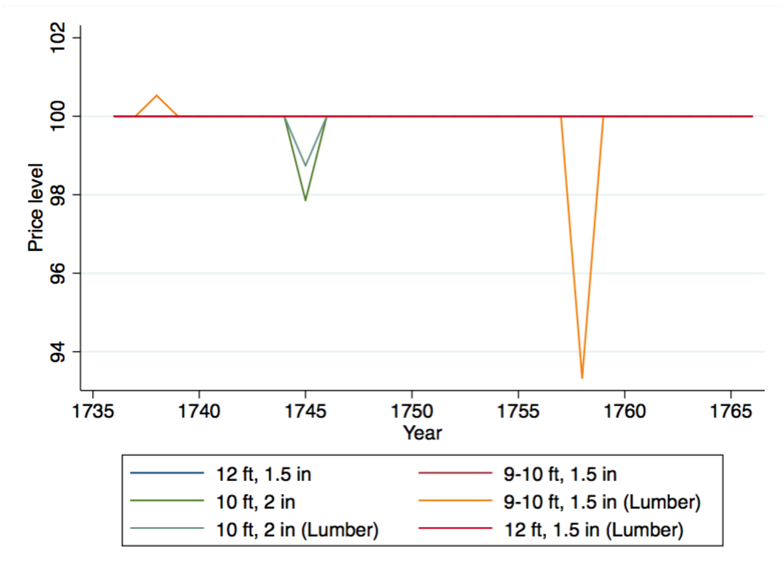

Figure B.10: Wood (Planks, Spruce)

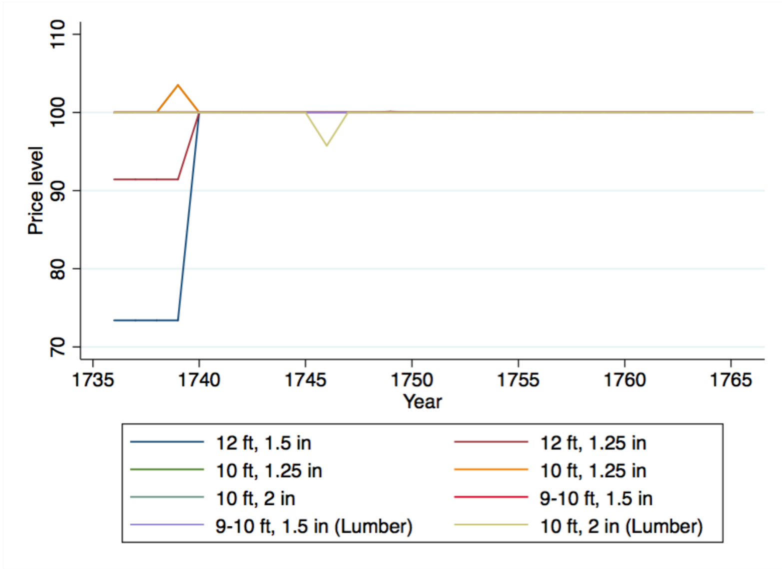

Figure B.11: Wood (Planks, Pine)

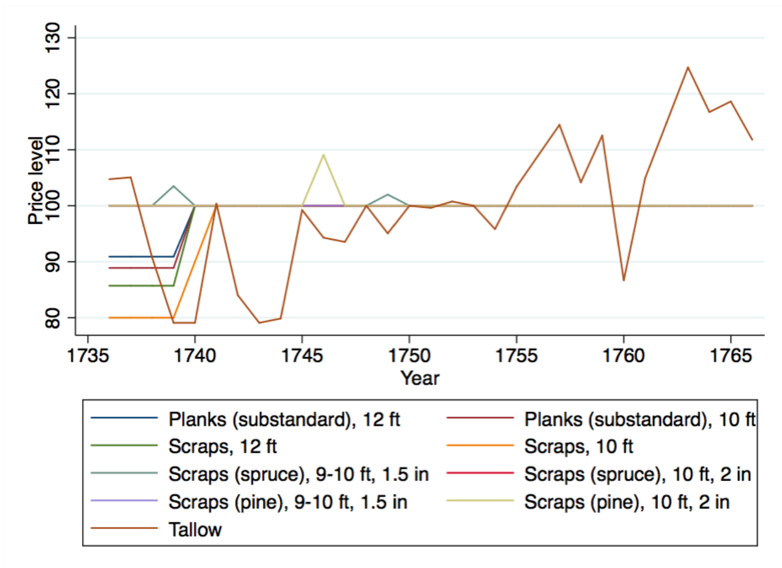

Figure B.12: Firewood and Tallow

C Wholesale Price Index

C.1 Weighted Groups

Table C.1: Weighted Commodity Groups for the WPI

Group	Weight (%)
Grain	20.0
Groats	17.5
Vegetables	5.0
Dairy Products	10.0
Meat	10.0
Iron	5.0
Drinks	5.0
Fish	10.0
Wood	12.5
Firewood & Tallow	5.0

C.2 Weighted Group Indices, WPI

Table C.2: Weighted Group Indices, WPI, 1736–1750

Group	Grain	Groats	Vegetables	Dairy Products	Meat	Iron	Drinks	Fish	Wood	Firewood & Tallow
Weight	20.0%	17.5%	5.0%	10.0%	10.0%	5.0%	5.0%	10.0%	12.5%	5.0%
Year										
1736	19.18	12.98	5.57	5.95	7.35	5.39	5.09	11.20	10.88	4.95
1737	21.81	12.50	5.11	6.53	7.77	5.48	5.58	12.44	11.06	4.96
1738	17.72	12.84	4.89	6.55	7.23	5.50	4.94	10.44	10.89	4.60
1739	16.70	11.77	4.54	6.62	7.27	5.46	4.35	10.37	10.73	4.32
1740	27.83	18.75	7.71	8.54	9.85	5.47	7.21	11.38	10.89	4.45
1741	34.39	21.35	9.10	10.96	11.92	5.45	9.00	10.43	10.89	5.01
1742	27.39	18.10	6.90	9.29	12.19	5.48	7.67	10.85	11.06	4.60
1743	22.46	16.82	5.57	8.31	10.66	5.48	6.40	13.02	11.10	4.48
1744	17.95	15.75	4.73	7.29	8.81	5.48	5.15	8.68	11.07	4.50
1745	19.74	17.13	4.91	9.64	9.31	5.20	4.86	12.45	11.10	4.98
1746	21.66	17.26	5.09	9.84	10.55	5.18	5.72	12.59	11.08	4.89
1747	22.87	17.25	6.26	9.41	9.51	5.18	6.54	11.38	11.07	4.84
1748	27.34	18.40	6.41	10.15	10.54	5.17	7.39	11.62	11.16	5.00
1749	30.30	20.44	7.14	10.23	10.62	5.04	8.21	12.43	11.11	4.88
1750	20.00	17.50	5.00	10.00	10.00	5.00	5.00	10.00	12.50	5.00

Table C.3: Weighted Group Indices, WPI, 1751–1766;

Group	Grain	Groats	Vegetables	Dairy Products	Meat	Iron	Drinks	Fish	Wood	Firewood & Tallow
Weight	20.0%	17.5%	5.0%	10.0%	10.0%	5.0%	5.0%	10.0%	12.5%	5.0%
Year										
1751	17.33	16.59	4.45	8.82	9.86	4.90	4.48	12.12	12.80	4.99
1752	17.93	16.45	4.66	9.16	8.67	4.97	5.33	10.89	13.53	5.02
1753	17.95	16.20	4.43	9.08	8.15	5.15	5.21	10.81	15.11	5.00
1754	17.94	15.74	4.28	8.68	9.43	5.28	5.01	9.11	15.26	4.90
1755	19.16	16.15	4.47	8.67	9.68	4.96	4.82	9.01	15.29	5.09
1756	26.92	23.60	6.52	9.66	11.72	4.96	8.89	9.21	15.3	5.22
1757	34.23	22.10	6.98	9.40	10.79	5.35	8.89	9.42	15.3	5.36
1758	36.61	23.22	8.10	9.54	13.73	5.35	9.88	7.96	15.27	5.10
1759	24.67	15.87	5.82	8.77	12.43	4.62	6.48	8.80	15.25	5.31
1760	22.87	17.25	5.64	8.18	12.33	4.62	6.79	8.74	15.2	4.67
1761	20.78	16.38	5.22	8.29	11.61	4.62	5.64	9.37	15.2	5.12
1762	28.67	17.72	6.57	9.82	12.48	4.62	7.40	10.73	15.23	5.37
1763	38.41	18.25	9.07	11.35	14.66	4.62	9.87	10.55	15.13	5.62
1764	32.60	20.53	8.46	12.09	16.98	5.46	8.77	13.19	15.32	5.42
1765	34.54	21.75	7.76	12.39	17.22	5.04	9.52	11.99	15.44	5.47
1766	30.71	19.56	6.96	12.57	16.59	5.04	8.66	12.41	15.41	5.29

D Cost of Living Index

D.1 Weighted Groups

Table D.1: Weighted Groups, CLI

Group	Weight (%)
Grains	21.5
Groats	19.5
Vegetables	6.0
Dairy Products	11.5
Meat	11.5
Iron	6.5
Drinks	6.0
Fish	11.0
Firewood & Tallow	6.5

D.2 Weighted Group Indices, CLI

Table D.2: Weighted Group Indices, CLI, 1736–1750

Group	Grains	Groats	Vegetables	Dairy Products	Meat	Iron	Drinks	Fish	Firewood & Tallow
Weight	21.50%	19.50%	6.00%	11.50%	11.50%	6.50%	6.00%	11.00%	6.50%
Year									
1736	20.62	14.47	6.68	6.84	8.45	7.00	6.10	12.32	6.43
1737	23.45	13.93	6.13	7.51	8.94	7.12	6.69	13.68	6.44
1738	19.05	14.31	5.87	7.54	8.31	7.16	5.93	11.48	5.98
1739	17.95	13.12	5.45	7.61	8.36	7.10	5.22	11.41	5.61
1740	29.91	20.89	9.25	9.82	11.33	7.12	8.65	12.52	5.78
1741	36.97	23.79	10.92	12.61	13.70	7.09	10.81	11.48	6.51
1742	29.44	20.17	8.28	10.69	14.02	7.12	9.20	11.93	5.98
1743	24.15	18.74	6.68	9.55	12.26	7.12	7.68	14.32	5.82
1744	19.30	17.55	5.68	8.39	10.13	7.12	6.18	9.55	5.85
1745	21.22	19.09	5.89	11.08	10.70	6.76	5.84	13.69	6.48
1746	23.28	19.24	6.10	11.32	12.14	6.73	6.86	13.85	6.35
1747	24.59	19.23	7.51	10.82	10.94	6.73	7.84	12.52	6.29
1748	29.39	20.50	7.69	11.67	12.12	6.72	8.87	12.79	6.50
1749	32.57	22.77	8.57	11.77	12.22	6.55	9.85	13.68	6.35
1750	21.50	19.50	6.00	11.50	11.50	6.50	6.00	11.00	6.50

Table D.3: Weighted Group Indices, CLI, 1751–1766)

Group	Grains	Groats	Vegetables	Dairy Products	Meat	Iron	Drinks	Fish	Firewood & Tallow
Weight	21.50%	19.50%	6.00%	11.50%	11.50%	6.50%	6.00%	11.00%	6.50%
Year									
1751	18.63	18.49	5.33	10.14	11.34	6.37	5.38	13.33	6.49
1752	19.27	18.33	5.59	10.54	9.97	6.46	6.39	11.98	6.52
1753	19.29	18.05	5.32	10.44	9.37	6.70	6.25	11.89	6.50
1754	19.29	17.54	5.14	9.98	10.84	6.86	6.02	10.02	6.36
1755	20.60	18.00	5.37	9.97	11.14	6.45	5.78	9.91	6.61
1756	28.94	26.30	7.83	11.11	13.48	6.45	10.67	10.14	6.79
1757	36.80	24.63	8.37	10.81	12.41	6.96	10.67	10.37	6.97
1758	39.36	25.87	9.72	10.97	15.79	6.95	11.85	8.75	6.64
1759	26.52	17.68	6.98	10.08	14.29	6.01	7.78	9.68	6.91
1760	24.58	19.22	6.77	9.41	14.18	6.01	8.15	9.62	6.07
1761	22.34	18.26	6.27	9.53	13.35	6.01	6.76	10.31	6.66
1762	30.82	19.74	7.88	11.29	14.35	6.01	8.88	11.81	6.98
1763	41.29	20.34	10.89	13.06	16.86	6.01	11.84	11.60	7.30
1764	35.05	22.88	10.15	13.90	19.53	7.09	10.52	14.51	7.04
1765	37.13	24.23	9.31	14.25	19.80	6.55	11.43	13.19	7.11
1766	33.01	21.80	8.35	14.46	19.08	6.55	10.39	13.65	6.88

E Producer Price Index

E.1 Weighted Groups

Table E.1: Weighted Groups, PPI

Group	Weight (%)
Wood	45.0
Fish	36.0
Firewood & Tallow	18.0

E.2 Weighted Group Indices, PPI

Table E.2: Weighted Group Indices, PPI, 1736–1766

Group	Fish	Wood	Firewood and Tallow
Weight	36.0%	45.0%	18.0%
Year			
1736	40.74	39.58	17.99
1737	45.22	40.21	18.02
1738	37.95	39.59	16.72
1739	37.72	39.03	15.70
1740	41.39	39.61	16.17
1741	37.94	39.61	18.22
1742	39.45	40.22	16.73
1743	47.34	40.35	16.28
1744	31.56	40.24	16.35
1745	45.26	40.36	18.11
1746	45.77	40.30	17.77
1747	41.39	40.27	17.59
1748	42.27	40.60	18.18
1749	45.22	40.41	17.76
1750	36.36	45.45	18.18
1751	44.07	46.55	18.15
1752	39.60	49.21	18.25
1753	39.31	54.95	18.18
1754	33.13	55.48	17.80
1755	32.75	55.59	18.49
1756	33.51	55.65	18.99
1757	34.27	55.65	19.50
1758	28.94	55.53	18.56
1759	31.98	55.44	19.32
1760	31.79	55.26	16.97
1761	34.08	55.28	18.63
1762	39.03	55.39	19.53
1763	38.36	55.03	20.43
1764	47.98	55.70	19.70
1765	43.60	56.14	19.88
1766	45.12	56.03	19.25

F Aggregate Price Indices and Inflation Rates

Table F.1: Annual WPI and Annual Percentage Change

Year	WPI	Annual % Change
1736	88.53	N/A
1737	93.23	5.31%
1738	85.61	–8.17%
1739	82.14	–4.05%
1740	112.08	36.44%
1741	128.51	14.66%
1742	113.52	–11.66%
1743	104.29	–8.13%
1744	89.40	–14.27%
1745	99.31	11.08%
1746	103.86	4.57%
1747	104.31	0.44%
1748	113.17	8.49%
1749	120.41	6.40%
1750	100.00	–16.95%
1751	96.34	–3.66%
1752	96.60	0.28%
1753	97.09	0.51%
1754	95.63	–1.51%
1755	97.30	1.75%
1756	122.02	25.40%
1757	127.84	4.77%
1758	134.75	5.41%
1759	108.01	–19.84%
1760	106.30	–1.59%
1761	102.23	-3.82%
1762	118.61	16.01%
1763	137.53	15.96%
1764	138.82	0.94%
1765	141.10	1.64%
1766	133.20	–5.60%
Avgerage % Change		2.03%

Table F.2: Annual PPI and Annual Percentage Change

Year	PPI	Annual % Change
1736	98.32	N/A
1737	103.45	5.22%
1738	94.26	–8.88%
1739	92.45	–1.92%
1740	97.16	5.09%
1741	95.76	–1.44%
1742	96.40	0.66%
1743	103.97	7.85%
1744	88.15	–15.21%
1745	103.73	17.67%
1746	103.84	0.11%
1747	99.25	–4.42%
1748	101.04	1.81%
1749	103.38	2.31%
1750	100.00	–3.27%
1751	108.77	8.77%
1752	107.07	–1.57%
1753	112.44	5.02%
1754	106.41	–5.36%
1755	106.83	0.39%
1756	108.15	1.24%
1757	109.42	1.17%
1758	103.03	–5.84%
1759	106.75	3.61%
1760	104.02	–2.55%
1761	107.99	3.81%
1762	113.95	5.52%
1763	113.82	–0.12%
1764	123.38	8.40%
1765	119.61	–3.06%
1766	120.41	0.67%
Average % Change		4.41%

Table F.3: Cost of Living Indices: Comparisons

	Dhawan & Langdal (2018)		Grytten (2004)	
Year	CLI	Inflation	CLI	Inflation
1736	88.92	N/A	96.00	N/A
1737	93.89	5.59%	113.33	18.05%
1738	85.63	–8.80%	102.00	–10.00%
1739	81.84	–4.43%	94.00	–7.84%
1740	115.27	40.85%	112.00	19.15%
1741	133.87	16.14%	149.33	33.33%
1742	116.82	–12.74%	142.67	–4.46%
1743	106.32	–8.99%	113.33	–20.56%
1744	89.74	–15.59%	103.33	–8.82%
1745	100.75	12.27%	96.00	–7.09%
1746	105.87	5.08%	102.00	6.25%
1747	106.46	0.56%	103.33	1.30%
1748	116.23	9.18%	102.00	–1.29%
1749	124.32	6.96%	100.67	–1.30%
1750	100.00	–19.56%	100.00	–0.67%
1751	95.50	–4.50%	98.67	–1.33%
1752	95.05	–0.47%	98.67	0.00%
1753	93.82	–1.29%	97.33	–1.36%
1754	92.05	–1.89%	95.33	–2.05%
1755	93.82	1.92%	98.67	3.50%
1756	121.69	29.71%	124.67	26.35%
1757	127.98	5.17%	170.00	36.36%
1758	135.90	6.19%	192.67	13.34%
1759	105.93	–22.05%	142.67	–25.95%
1760	104.01	–1.81%	148.67	4.21%
1761	99.48	–4.36%	144.67	–2.69%
1762	117.76	18.38%	149.33	3.22%
1763	139.18	18.19%	160.00	7.15%
1764	140.68	1.08%	147.33	–7.92%
1765	142.99	1.64%	156.00	5.88%
1766	134.17	–6.17%	168.67	8.12%
Average Inflation		2.21%		2.76%

G Swedish and Danish CLIs

Table G.1: Price Indices and Yearly Inflation for Denmark and Sweden, 1736–1766 (Danmarks Nationalbank, 2010)

	Denmark (Abildgren, 2010)		Sweden (Evinsson & Söderberg, 2011)	
Year	Price Levels	Inflation	Price Levels	Inflation
1736	90.40	N/A	79.88	N/A
1737	88.85	–1.71%	71.95	–9.92%
1738	89.01	0.18%	69.13	–3.93%
1739	84.17	–5.44%	76.14	10.14%
1740	88.01	4.56%	89.34	17.34%
1741	95.19	8.16%	99.16	10.99%
1742	92.15	–3.19%	92.15	–7.06%
1743	89.71	–2.65%	89.10	–3.31%
1744	94.70	5.56%	85.22	–4.36%
1745	101.19	6.85%	94.24	10.57%
1746	110.01	8.72%	98.34	4.36%
1747	105.90	–3.74%	104.21	5.97%
1748	101.33	–4.32%	111.95	7.43%
1749	99.59	–1.72%	104.47	–6.69%
1750	100.00	0.41%	100.00	–4.28%
1751	91.38	–8.62%	105.31	5.31%
1752	94.48	3.39%	105.26	–0.04%
1753	88.22	–6.63%	102.76	–2.37%
1754	101.41	14.95%	107.59	4.70%
1755	101.48	0.07%	114.97	6.85%
1756	104.73	3.20%	127.75	11.12%
1757	119.33	13.94%	137.91	7.95%
1758	127.58	6.91%	138.22	0.22%
1759	112.04	–12.18%	130.30	–5.73%
1760	110.04	–1.79%	135.74	4.17%
1761	111.24	1.09%	157.50	16.03%
1762	118.58	6.60%	219.44	39.32%
1763	139.61	17.73%	237.79	8.36%
1764	138.09	–1.09%	251.34	5.70%
1765	148.51	7.55%	235.51	–6.30%
1766	138.44	–6.78%	209.01	–11.25%
Average Inflation		1.67%		3.71%

H Excluded Commodities

Table H.1: Arendal, Christiania, Drammen

Arendal	**Christiania**
Planks, spruce and pine	Iron, Swedish
Planks, sub-standard quality and scraps	Rye, dantzig
Rye, foreign	Iron rod, Swedish
Rye, Danish	Planks, lumber-type, pine, 12 ft, 1.5 in
Barley, foreign	Planks, scraps-type, pine, 12 ft, 1.5 in
Barley, Danish	Planks, pine, 10 ft, 2 in
	Oatmeal
Drammen	
Small planks, 12 ft, 1.5 in	
Planks, spruce, 12 ft, 1.5 in	

Table H.2: Kristiansand

Kristiansand	
Planks, 12 ft, 1.25 in, 7 in wide	Meat, smoked
Planks, 10 ft, 1.25 in, 7 in wide	Eel, salted
Planks, 12 ft, 7 in	Duck, salted
Planks, 10 ft, 7 in	Mutton, salted
Planks, spruce, 12 ft, 1.5 in	Mutton, dried
Planks, pine, 10 ft, 1.25 in	Goose, salted
Planks, sub-standard, 10 ft, 1.5 in	Flour
Planks, scrap, 10 ft, 1.25 in	Lard
Rye, foreign	Rice grains
Gryn, holstensk	Sprat, salted
Salmon, smoked	Ox, salted
Salmon, salted	Bromser
Pork, dried	Langer
Pork, salted	Råskjær
Jern, i stenger	Mackerel
Pollock	

Table H.3: Fredrikstad

Fredrikstad	
Mackerel, salted	Herring, oily
Herring, oily, salted	Small planks, pine, 10 ft,
Herring, oily, salted, poor quality	Small planks, pine, 10 ft, 2–2.25 in
Tallow candle	Small planks, spruce, 10 ft, 2–2.5 in
Planks, pine, 9–10 ft, 2 in	Small planks, spruce, 10 ft, 1.25 in
Deler, undermåls, halve, kanthugne og vragdeler	Small planks, pine, 10 ft, 1 1/8 in
Cured Herring	Small planks, 10 ft, 2.25 –2.5 in
Planks, pine, 11-12 ft, 2 in	Small planks, spruce, 1.25 in
Planks, pine, 9-10 ft, 1 1/8 in	Small plank, spruce, 10 ft, 1–1 1/8 in
Planks, spruce 9-10 fot, 1 1/4 in	Parts, pine, scraps
Small planks, spruce, 9-10 fot, 1 1/8 in	Planks, 2.5 in
Apples	Planks, 2 in
Cod	Small planks, spruce
Pollock, dried	Cod, salted
Deler, vraks vrak	Herring, salted, poor quality
Small planks, pine, 9- 10 fot, 2.–2 1/2 in	Small planks, 12 ft, 1.25 in
Small planks, pine, 9-10 fot, 1 1/4 in	Parts, pine, 10 ft, 1.25 in
Small planks, pine, 11-12 ft 2-2 1/2 in	Small planks, pine, 11–12 ft, 1.25
Flour	Herring, Bergen
Small planks, scraps	Rye flour
Sei, gråsei	Barley flour
Small planks, spruce 2 in	Small planks, pine, 8-9 ft
Small planks, spruce, 1–1 1/8 in	Small planks, pine, 10 ft, 2 in

I Interpolations

The standard method involved using the price series of a substitute good, shown below.

Table I.1: Interpolated Commodities (Part 1/2)

Commodity	**Year(s) with Lacunae**	**Interpolated with**
Cheese	1756	Butter
Iron	1753	Iron rod
Iron	1756	Iron rod
Groats (grains)	1736	Groats (barley)
Groats (grains)	1744–1747	Groats (barley)
Grains (rolled oats)	1756	Groats (barley)
Grains (buck wheat)	1756	Grains (rolled oats)
Herring (salted)	1741, 1748–1766	Prices from Moss
Cod (stockfish)	1740–1741, 1743–1744, 1749–1766	Prices of Herring for the same period
Meat (salted)	1736–1737, 1741–1756, 1759–1763	Prices of Pork for the same period
Tallow	1756	Avg. of 1755 and 1757

Table I.2: Interpolated Commodities (Part 2/2) (s=spruce, p=pine)

Commodity	**Year**	**Interpolated with**
Small planks (p), 10–12 ft, 2.5 in	1736–1749, 1753, 1754, 1756, 1765	Small planks (p) 9–10 ft, 1-25–1.5 in
Small planks (s), 11–12 ft, 2.5 in	1751–1753	Small planks (s), 10–11 ft, 2.5 in
Planks (p), 10 ft, 1.25 in	1739	Planks (s), scraps, 9–10 ft, 1.5 in
Small planks (p), 9–10 ft, 1.25 in	1759–1766	Small planks (p) 9 ft, 1-25 in
Small planks (s), 10–11 ft, 2.5 in	1740–1749, 1754–1766	Small planks (s), 11–12 ft, 2.5 in
Small planks (s), 10–12 ft, 2.5 in	1736–1751	Small planks (s), 9–10 ft, 2.5 in
Small planks (p), 9 ft, 1.25 in	1736–1754	Small planks (p), 9–10 ft, 1.25 in
Small planks (p), 10–12 ft, 1.25 in	1736–1741	Small planks (p), 9 ft, 1.25 in

For some types of wood and firewood, prices remained constant for the entire 31-year period. We could therefore assume that years with lacunae in the price series would also have had the same price. Below we show which types of wood had constant price trends:

Table I.3: Commodities with Constant Prices

Type of Wood	**Years with Lacunae**
Small planks (pine), 12 ft, 1.5 in	1756, 1759–1766
Small planks (spruce), 11–12 ft, 2.5 in	1736–1739
Planks (spruce scraps), 9–10 ft, 1.5 in	1756, 1759–1766
Planks (spruce), 12 ft, 1.5 in	1756, 1759–1766
Planks (lumber, spruce), 9–10 in, 1.5 in	1756, 1759–1766
Planks (spruce), 9–10 ft, 1.5 in	1756, 1759–1766
Planks (pine, scraps), 10 ft, 2 in	1756, 1759–1766
Planks (spruce), 9–10 ft, 1.5 in	1756, 1759–1766
Planks (lumber, spruce), 10 ft, 2 in	1756, 1759–1766
Planks (spruce), 10 ft, 2 in	1756, 1759–1766
Planks (pine scraps), 10 ft, 2 in	1756, 1759–1766
Planks (lumber, pine), 10 ft, 2 in	1756, 1759–1766
Planks (pine), 10 ft, 2 in	1756, 1759–1766
Planks (lumber, spruce), 12 ft, 1.5 in	1756, 1759–1766
Small planks (pine), 9–10 ft, 1.25 in	1756, 1759–1766

For some commodities, prices were not constant, but only changed once or twice. Therefore, prices were often stable for many consecutive years. For some lacunae we simply referred back to the last noted price, which often existed both before and after the lacunae.

Table I.4: Interpolation Using Last Noted Price

Commodity	**Years with Lacunae**	**Last Noted Price**
Small planks (spruce), 10–12 ft, 2.5 in	1752–1754, 1755, 1759, 1764	1760
Planks, substandard quality, 12 ft	1752–1766	1751
Planks, substandard quality, 10 ft	1740, 1741, 1752–1766	1751
Planks, scraps, 12 ft	1752–1766	1751
Planks, scraps, 10 ft	1752–1766	1751
Planks (pine), 12 ft, 1.5 in	1736–1738	1739
Planks (pine), 12 ft, 1.5 in	1752–1766	1751
Planks (pine), 12 ft, 1.25 in	1752–1766	1751
Planks (pine), 10 ft, 1.25 in	1736–1738	1740
Planks (pine), 10 ft, 1.25 in	1752–1766	1740
Iron rod	1756	1755
Iron rod	1759	1760

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