Famines in the Nordic countries, AD 536 - 1875

Dribe, Martin; Olsson, Mats; Svensson, Patrick

2015

Lund Papers in Economic History

No. 138, 2015 *General Issues*

Famines in the Nordic countries, AD 536–1875

Martin Dribe, Mats Olsson, and Patrick Svensson

DEPARTMENT OF ECONOMIC HISTORY, LUND UNIVERSITY

Lund Papers in Economic History
ISRN LUSADG-SAEH-P--15/138--SE+40

Orders of printed single back issues (no. 1-65)
Department of Economic History, Lund University
Postal address: P.O. Box 7083, S-220 07 Lund, Sweden
Telephone: +46 46 2227475
Telefax: +46 46 131585

Full-text electronic issues (no. 58, 60, 61, 66--)
www.ekh.lu.se

Lund Papers in Economic History are published by the Department of Economic History, Lund University, Sweden. This series replaces the former series under the title *Meddelande från ekonomisk-historiska institutionen, Lunds universitet*. The change of name reflects the orientation of the series towards an international readership. The series is multilingual, but the majority of the working papers appear in English.

Lund Papers in Economic History include papers in the following topic areas:

General Issues
Development Economics
Education and the Labour Market
Population Economics

Lund Papers in Economic History are published as occasion arises, not at fixed intervals. Printed issues are distributed to libraries. From 1999 and onwards, full-text electronic issues are also available on *www.ekh.lu.se.* Those who would be interested in receiving information by email on new issues of **Lund Papers in Economic History** are requested to send an email message to *Lund.Papers@ekh.lu.se.*

LUND
UNIVERSITY

Famines in the Nordic countries AD 536–1875

Martin Dribe, Mats Olsson, and Patrick Svensson

Abstract

The first part of this paper aims at identifying the timing of famines in the Nordic countries since the middle ages. This is done by using qualitative famine reports from the literature since quantitative data on famines are scarce or non-existent, at least before the early modern period. We supplement the reports with climate data and price data. Our survey indicates that widespread famine was always a rare occurrence in the Nordic countries, despite frequent crop failures. The second part studies the regional famine pattern and its demographic characteristics in Sweden 1750–1910. This part is based on demographic data on parish level from the official statistics and price data. We identify two periods of excess mortality: the last major famine in Sweden in the early 1770s and the excess mortality in 1809 due to epidemic outbreaks. Examining the age-specific mortality and seasonality pattern in these two years of mortality crises in Sweden we show a highly similar pattern explained by similar causes of death being involved: dysentery and typhus. All age groups were affected during the crisis, but children over the age of one were hardest hit. Mortality was highest during the summer and early fall as epidemics spread rapidly through water and food. Thus, while Nordic people clearly were vulnerable to economic fluctuations, conditions rarely deteriorated to famine levels, which can be explained as a combination of a reasonably well-functioning market, a diversified economy, a population density in line with resource availability and the absence of serious political or war-related conditions conducive to famine.

Keywords: famine, mortality, climate, food prices, harvests, Nordic countries, Middle Ages, 19th century

JEL classifications: I31, N33, Q54

Introduction

Famines of different magnitudes have been reported in Nordic literature from the Middle Ages until the late nineteenth century. Most reports are based on contemporary sources that include qualitative statements on the causes and effects of the fatal events. Except for some Finnish famines in the seventeenth and nineteenth centuries and for a shorter period in early modern Sweden, Nordic famines have not been studied in detail. In this chapter, we focus on the Nordic countries from AD 536 to 1875.

The first part of this chapter aims at identifying the timing of famines in the Nordic countries since the Middle Ages. This identification is made by combining qualitative famine reports from the literature with price data and climate information. The second part aims to study regional famine patterns and their demographic characteristics in Sweden 1750–1875. The focus here is to identify periods during which high food prices and excess mortality coincided at the county level and to make a deeper study of age- and sex-specific mortality as well as seasonal patterns in years of mortality crisis. In this part, we will use demographic data from the official statistics available from 1749 onwards.

The Nordic countries are Denmark, Sweden, Finland, Norway and Iceland. Denmark was the most populated country in Scandinavia from the Middle Ages to the sixteenth century. During this period, Denmark also incorporated the provinces of Scania, Halland and Blekinge, which were lost to Sweden in 1658, as well as Schleswig-Holstein, lost to Germany in 1864. Denmark also ruled Norway from 1380/1536 until 1814. Sweden and Finland constituted a united kingdom until 1809, when Finland became an autonomous grand duchy under Russia. During the seventeenth century, Sweden conquered the above-mentioned southern provinces of Denmark as well as Jämtland and Härjedalen of Norway/Denmark. From 1814 to 1905, Sweden and Norway were in a union ruled by the Swedish king. Sweden also held provinces outside of the Nordic realm, not included in this analysis. Finally, Iceland was settled by Norsemen in the ninth century but lost its independence in 1262 and was then under Danish rule until the twentieth century. In our discussion, we treat the five countries as separate units but hold the internal Nordic divisions of provinces as they were at the time.

Map 1. The Nordic countries

Map: Finn Hedefalk, Lund University

The Nordic countries are situated near the limit of possible crop farming. Central Sweden and Norway are at the same latitude as Alaska and southern Greenland, but the Gulf Stream has enabled cultivation in northern Scandinavia and even on Iceland. Whereas precipitation was important for agriculture in continental Europe and Great Britain, where drought or overly wet weather negatively affected food production, temperature appears to have been decisive for Northern Europe (Utterström 1955:5). There, agriculture's sensitivity to temperature shocks was not primarily due to low temperatures but was due to how long the winters were, which governed the length of the growing season. In this respect, the temperature and humidity in the spring and the short summer were also of importance. The summer was short but intense, and the interconnections between weather and harvests were complicated in this respect. When mapping bad harvest years in Scandinavia, hot and dry summers appear to have been as frequent as cold and wet ones, where the latter dominated before the eighteenth century, and the former dominated thereafter (Utterström 1955; Edvinsson, Leijonhufvud and Söderberg 2009:119–126).

Short-term climatic shocks may be caused by changes in annual weather systems but also by volcanic activity. Although only Iceland experienced volcanic eruptions within its territory, some of the major eruptions on other continents are likely to have affected harvests in the Nordic countries. The eruptions of Kaharoa in New Zealand in 1314 (±12 years), which lasted for 4–5 years, have been connected to the great famine of the 1310s (Nairn et al, 2004). In the same way, eruptions in 1453 (Kuwae in Vanuatu), in 1600 (Huaynaputina, Peru), in 1783 (Laki, Iceland), and in 1815 (Tambora, Indonesia) might have also affected growing conditions in the Nordic realm (Briffa et al., 1998). Another study shows that the 1600 eruption made the following summer the coldest of the past 1,500 summers in Scandinavia (Shanaka et al., 1998).

Long-term climatic changes also affected the Nordic countries as they, both between and within countries, are situated on different latitudes; in Sweden, cultivation possibilities were quite different between the southern parts and the most northern parts, and conditions were of course very different between Denmark and Iceland. The so-called medieval warm period, stretching from approximately AD 1000 to the fifteenth/sixteenth century, meant that even in the most northern parts of the Nordic countries, farming grain was possible (and even in Iceland and Greenland (Utterström 1955; Hybel and Poulsen 2007:60–64). When average temperatures declined, during what is often called the Little Ice Age, grain farming was no longer possible, which implied that the Viking settlements on Greenland disappeared, and cereal production changed to animal herding and fishing in Iceland. Thus, temperature and the

length of the growing season varied both in the short term and in the long term, and in the northernmost part of Europe, this variation made agriculture, and thereby food provision, vulnerable and dictated population settlement (e.g., Solantie 1988).

Famines up to 1580

The first known famine in the Nordic countries was until recently quite unknown. Notwithstanding, it was probably the most profound and severe famine ever; it eradicated a large part of the Scandinavian population, and it has been suggested that it even changed the beliefs and the religion of those who survived (Gräslund 2007; Gräslund and Price 2012).

In 536 and 537, ashes darkened the sky, and the summer never came. This major geological event, which emanated from volcanic eruptions or the impact of celestial objects, is well documented in Chinese and European late antique sources, and it has also been confirmed in dendrochronology and in ice core samples from both pools (Devroey and Jaubert 2011:10). The Nordic countries were probably the hardest hit by the catastrophe, but because written sources from this part of the world are lacking, the extent has not been registered (Gräslund 2007).

The preceding centuries can be characterized as the most expansive in Nordic prehistory (Pedersen and Widgren 2011: 52–59). Just at the time of this disaster, settlement and cultivation had reached their largest extent before the eighteenth century in many parts of Sweden. However, the expansion was abruptly broken in 536, with abandoned villages and farms – the most dramatic and sudden change in the cultural landscape of Sweden, southern Norway and the Baltic lands since the introduction of agriculture 6,000 years ago. Northern Norway appears to have fared better, perhaps because agriculture was often a supplement to fishing. The same was true for Finland, where agriculture was often combined with cattle rearing and foraging and where no decline in settlements can be observed in the sixth and seventh centuries. However, the crisis appears to have been devastating for areas in contemporary Estonia and Latvia (Tvauri 2014: 39–40).

Prior to this catastrophe, religious beliefs in the Nordic countries appear to have primarily revolved around fertility and the sun. Now, when the sun had failed with the result that perhaps half of the population died, a new and much darker religion was established. This complex mythological world was populated by violent gods and giants who fought against each other, and it was prevalent from that point into the upcoming Viking Age. In the myths about Ragnarök, the earth's destruction, the "fimbul winter" was replicated – the years when

summer never came (Gräslund and Price 2012). This event, hidden in the dim light of prehistory, does indeed indicate that agriculture in the Nordic countries was near the limit of where farming was possible.

We know very little about famines during the Viking Age (793–1050) or the Nordic Middle Ages (1050–1520) and very little about their effects during even early modern times until 1750. At least for the early periods, designations of famines tend to correlate more with the preservation of letters and other writings, often with a political bias, than with high food prices or poor harvests. Even as late as during the reign of Gustav I of Sweden (1523–1560), the king was, to his annoyance, held responsible by the peasants for years of distress (KLNM: 468). Nevertheless, because the chronicles devoted much space to weather and harvests, indicating their importance for medieval society, and because they are almost the only existing sources, they have been used to assess whether common European famines also took place in the Nordic countries (Hybel and Poulsen 2007:67–68). Hybel and Poulsen's point of departure is that it was primarily when bad weather affected larger areas and over a prolonged period, at least back-to-back harvest failure, that it resulted in famines. Combining the chronicles with other sparse narratives, they concluded that severe food crises most likely occurred in Denmark in 1099–1101, 1196–98, 1225–26 and probably also 1310 and 1315–17 (Hybel and Poulsen, 2007:75).

The dating of these famines is, however, in some cases doubtful. For example, the 1099–1101 famine is associated with King Olaf Hunger (1086–96), who came into power after his brother was killed and was given his surname because Denmark was said to be haunted by famines during his reign. According to Saxo Grammaticus, this king even sacrificed his own life to end the torment of his land (Boisen 1985: book 12). So the case rests either upon the chronicles deliberately assigning the famines to his reign despite their actually taking place after his death to show what happens when a unrighteous King takes power or on a false dating of the reign itself. Hybel and Poulsen base the famine of 1196–98 on evidence that surrounding areas were hit by famine and on notations in the chronicles of a tremor in Denmark. Likewise, the 1225–26 famines rest upon English grain exports to Denmark, despite bad harvests in England, and on one notation saying "erra vastata est" which could be interpreted as "the land is devastated" (Hybel and Poulsen 2007:74).

However, for the famine in the 1310s, there are sources both in Sweden and Denmark indicating that this severe famine was also present in the Nordic countries; a now lost chronicle for the year 1315 was cited in a book printed in 1592 stating that "Pluvia et tonitrua horrenda per totam aestatem; fames et pestis secutae, quibus tertia pars viventium absumta

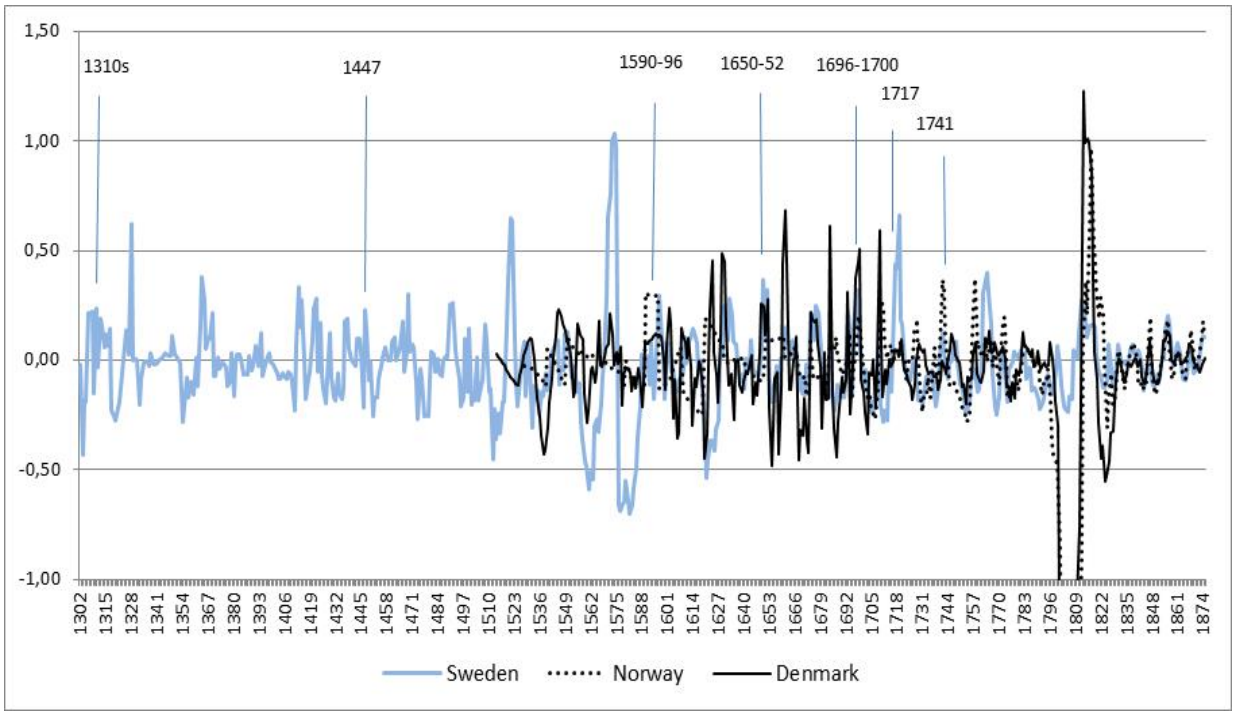
est", i.e., that rain and thunder were horrible throughout the whole of the summer; famine and pestilence followed and a third of all living were struck (Utterström 1955:18). Furthermore, tithes were not paid in parts of Sweden in 1316–17 and 1319, cattle plague was mentioned for Sweden in 1316, and from Danish sources, a drought appears to have taken place in 1310 and very wet years in 1315–17, although the chronicles disagree for these years (Myrdal, 1999:119, 174–76; Hybel and Poulsen, 2007:67–68, 75).

Because sources are rare, Hybel and Poulsen did not want to dismiss the possibility that other famines found for northern Europe, 1005–06, 1043–45, 1124–26, 1144–1147 and 1149–51, also hit Denmark, although no records of this have been found. Ignoring the back-to back criteria, the year 1283 also appears to have experienced a severe famine according to Danish sources, whereas one chronicle from Sweden mentions 1291 as a famine year, caused by several years of drought (Hybel and Poulsen, 2007:74; Myrdal, 1999:119).

As for Iceland, the famous Landnámabók (Book of Settlements) mentions "a great famine-winter in Iceland in heathen days, the severest there has been in Iceland. Men ate ravens then and foxes, and many abominable things were eaten which ought not to be eaten, and some had the old and helpless killed and thrown over the cliff". This was the winter of 975–76; Landnámabók also mentions 1057–58 and 1118 as major famine years (Tomasson 1977: 409). The frequent volcanic activity on the island caused devastation and famines; one of the most severe before the Laki disaster in 1783 was the eruption of Hekla in July 1300 (Thorarinsson 1944: 64–80).

For the Late Middle Ages, sources are even sparser, but the chronicles that do exist speak of years with very cold winters, creating ice passages between the islands of Denmark, e.g., 1323, 1431, 1452 and 1546 (Hybel and Poulsen, 2007:76). Wet years are also recorded, and 1347 and 1489 stand out among these. However, none of these years can in any other way be related to famines, which is why Hybel and Poulsen ended up with no evidence of famines between 1315/17 and 1500 in Denmark. For Sweden, some years during the reign of Christopher of Bavaria (1441–48) were hit by severe crop failures, resulting in his nickname "King Bark" (Myrdal, 1999:193). However, Swedish sources also suggest that the period from the mid-fifteenth century to the second half of the sixteenth century appears to have experienced a better climate and no real famines; from 1460 to 1546, the southwestern part of the Baltic was never completely frozen, and the vast number of preserved letters from King Gustav 1 (1521–60) speak of no severe famines during this period (Utterström 1955:22–24).

Figure 1. Scandinavian consumer prices 1302–1875, annual deviations from trend (25-year moving average), logarithmic values.



Sources: Prices, Edvinsson and Söderberg (2010), Abildgren (2010) and Grytten (2004); possible famine years, see text.

Note: Possible famine years, coinciding with CPI more than 0.3 log points above trend, are highlighted.

Another way to approach medieval famines is to use prices. It has been possible to construct a consumer price index for Sweden from 1290 onwards and for Denmark and Norway from the early sixteenth century. Figure 1 shows the annual logged deviations from a moving 25-year average. Because these are capital city prices, they can hardly reflect the fluctuations in all parts of the Nordic countries, but they are the best series we could obtain for before the eighteenth century.

There are some medieval years that stand out. None of these years correspond with the worst years in England, as revealed by grain prices, tithe series and manorial grain yields (compare with Campbell 2009:30). Apparently, there is no strong Swedish price effect from the crises that hit southern Scandinavia in the 1310s (Myrdal 2011:79) or the year 1448, which in the Karl Chronicle is described as the worst famine year during the late Middle Ages. In the latter case, however, there are some indications from tithe records that the harvest was bad in a parish 70 kilometres to the north of Stockholm (KLNM:467), and the antecedent year exhibits 28 percent higher grain prices than the surrounding years. The only

Nordic high or late medieval year mentioned in Cornelius Waldorf's overview of the famines of the world is 1442; this and the surrounding years had low or normal consumer prices. The most spectacular sixteenth century periods, in terms of consumer price changes, are 1520–23 and 1571–74; however, these are barely connected to any harvest failures or subsistence crises but are connected to monetary policies. In the first period, both Christian II of Denmark and Gustav I of Sweden issued so-called klipping coins, with a very low silver value, that immediately fuelled inflation, and in the second period, the Swedish mark coin was debased (Edvinsson and Söderberg 2010: 425; 428). A similar depreciation of the Danish mark coin took place at the same time (Aakjaer 1936: 255).

Famines in the early modern period

If it is hard to find evidence of major famines from around the 1320s to the second half of the sixteenth century, perhaps with the exception of 1447–48 in Sweden, this is not the case for the subsequent two centuries. What Utterström (1955:23) refers to as the European crisis of 1556 appears to have affected Denmark but not Sweden. However, the major famines before and after 1600 and in the 1690s, followed by a number of shorter crises in the eighteenth century including the early 1770s and 1780s, stand out in this period even if the effects differed across countries.

Sources on the local level in Denmark indicate that the climate changed after approximately 1560–70. Flooding and storms hit western Denmark regularly but increased in intensity after 1570. From that year to 1661, the town of Ribe was hit by major storms no fewer than 43 times. The effects were severe both for the town itself and for the uplands, where meadows and fields were destroyed. Storms also swept sand in over the fields. After the flooding in 1593, Ribe was exempted from taxes for two years (Degn 1981:410). Furthermore, local sources on climate, harvests and market price scales (kapitelstakster) from Ribe mention 1593, 1594, 1597 and 1601 as bad harvests and 1596–1600 as years with high prices and regulations that stopped grain from leaving the province around the town (Degn 1981:414, 434). Population figures for the town show a 6–7 per cent lower population in 1590–99 compared to that in 1580–89 (Degn 1981:439).

The famine of the late 1590s also hit southeastern and western Sweden as well as southern Norway (Utterström, 1955:26). In the first years of the seventeenth century, famine also affected central and northern Sweden. A foretaste of the long period of bad years came in 1591 in Norway and 1592–93 in western Denmark. After a few years with good harvests, the

real difficulties started in mid-summer 1595, when a torrential rain destroyed the crops. Then followed two very wet years, with the second year also being very cold well into the summer. The year 1601 also appears to have been exceptionally bad. Two contemporary sources, one from southeastern Sweden and one from western Sweden, describe the weather and harvests as well as the effects on people and animals during the 1590s crisis (see Utterström, 1955:26–30). Both sources agreed on the very serious situation, with harvest failures leading to people eating "mash, chaff, bark, buds, nettles, leaves, hay, straw, peatmoss, nutshells, peastalks, etc." and even so "an innumerable number of people died" (Utterström 1955:27). A church book from Uppland, in central Sweden, also corroborates these statements, although dealing with the period 1601–03 and thereby indicating the spread of the crisis to central Sweden (Heckscher 1936:403). The prices in figure 1 (see also table 1) show that 1597 in Sweden, and the preceding years in Norway, were years of high prices, whereas the statement by Heckscher (1936:403) that 1601–03 was a period of "very high rye prices" is not corroborated. In Finland, 1601 was also described as a devastating year, and the famine of that year has been regarded as one of the most severe of the early modern period, aside from that in the late 1690s (Johanson 1924:63; Holopainen and Helema 2009).

In the half century following the 1590s/1600-crisis, Sweden appears to have escaped famines except for the years 1630 and 1633 (Heckscher 1936:403–404). In 1630, reports from southern Sweden reveal that the bad harvest forced people to eat bark because food was lacking. For the year 1633–34, Sweden, Finland and the Swedish possessions in the Baltic countries were affected by a famine resulting in increased mortality, as shown both by narratives and in the low population level in the annual poll-tax registers (Heckscher 1933; Heckscher 1936:404). For Denmark, the previously mentioned sources from Ribe show that the early 1620s contained a number of bad harvest years in a row: 1621–24 and 1648–51 were characterized by harvest failures and high prices (Degn 1981:414). Rye prices from Zealand corroborate both these periods as high price years but also show that 1628–30 had high prices (Johansen 2002:14). According to Johansen, the bad harvest years of the early 1620s did not manifest themselves in increased mortality, whereas there was increased mortality in 1628–30 (Johansen 2002:24–25). The causes for this increase are, however, unclear; for Jutland the invasion of German troops and records of typhus and dysentery might speak in favour of a famine, whereas for the rest of the country, measles, smallpox, or scarlet fever epidemics appear to be more likely causes of high mortality.

The high prices found in the early 1650s in Denmark and the records of bad harvests do not concur with the mortality pattern across the country. Because excess mortality occurred in

different years of the 1650s for different parishes, Johansen interprets the increased mortality as primarily caused by epidemics, such as measles, rather than famine (Johansen 2002:27–28, 35–36). The same conclusion can be drawn from Norwegian sources, where the mortality crisis of 1650–51 appears to primarily have hit children and young people and was caused by epidemics (Mykland 1977: 150–60). In Sweden, on the contrary, 1650 and 1651 saw severe crop failures resulting in very high prices in 1650 and 1652 as well as excess mortality in several parts of the country; more than doubled crude death rates (CDR) are seen in the east of Sweden in 1650 and in 1651–52 in the north, middle and east of the country (Heckscher 1936:405; Larsson 2006:68, 90). All export of grain was banned, and it is said that bakers in Stockholm fought by the toll gates to acquire any grain at all. Imports of grain now became substantial and necessary, above all those from the Baltic states (Myrdal 1999:244).

The 1670s were also a difficult time in the Nordic countries. In 1675, famine struck northern and central Sweden, in 1676 it struck inland and coastal Norway and Denmark, and in 1677 it again struck Denmark. The primary reasons were harvest failures accompanied by high prices: 25–30 per cent higher than for surrounding years in both Sweden and Denmark. For Norway, mortality data for the period are scarce, but for Sweden, overall mortality more than doubled whereas for Denmark mortality was approximately 37 percent higher than normal in 1676 and marginally lower the following year (Dyrvik et al. 1976; Larsson 2006:68, 90; Johansen 2002:61–62). The primary causes of death in Denmark were typhus and dysentery, which both clearly depended on nutrition (Livi-Bacci 1991:38).

The, in many aspects, troublesome seventeenth century ended with the 1690s crises that foremost hit Finland and parts of Sweden but also affected other parts of the Nordic countries and the Baltic states. For Finland, mortality estimates following the 1696–97 harvest failures indicate that between a quarter and a third of the population died, with the higher number being more plausible (Jutikkala 1955:53). Although people appear to have died from diarrhoea, caused by famine foods, already in 1696, the peak in mortality came in the spring and summer of 1697 with the spread of dysentery, typhus and typhoid fever (Lappalainen, 2014). Harvests also failed in Sweden during these years, primarily in the northern and central parts of the country, with high prices on food particularly in 1696 and 1697. According to Jutikkala, failed harvests were probably not reflected in a significant increase in mortality for 1697, but in 1698, some regions had mortality rates as high as 90 or even 160 per 1000 (Jutikkala 1955:56). However, according to subsequent research, CDR more than doubled in northern and central Sweden in all three years, 1696–98 (Larsson 2006:68, 90). Meanwhile, in the very south of Sweden, Scania had a mediocre harvest, which in fact resulted in a surplus

that could be sent to adjacent Swedish counties (Jutikkala 1955:56). Several hundred thousand barrels of grain were also imported to Sweden from the Baltics during these years to alleviate the famine (Myrdal 1999:244). This famine has also been identified for major parts of Norway, at least in 1696. While the high mortality figures in 1695 were attributed to epidemics, the harvest in September that year was described as "frozen away", which contributed to the demographic crisis the subsequent winter and spring (Dyrvik et al. 1976; Mykland 1977:150–160). In contrast, there are no figures indicating either high prices or excess mortality in Denmark during this period, aside from the year 1700 (Johansen 2002:61). That year, mortality was approximately 35 per cent higher than normal, and the year before, food prices had peaked, probably due to the harvest failure in 1699.

In eighteenth-century Sweden, excess mortality (equivalent to a doubling of normal CDR) has been found in connection with reported harvest failures on four occasions between 1647 and 1775 (Larsson 2006: 68; 90): 1717 in the north and west of Sweden, 1740 in central Sweden, 1743 in northern and central Sweden, and finally 1773 in central Sweden. In the south and east of Sweden, 1710 and 1711 were also years of excess mortality, but in these years, the crop failure in 1709 interacted with a war in 1710 and the spread of the plague the same year. For the nineteenth century, severe crop failures were recorded for the years 1812, 1816, 1826, and 1841, but the effects of these appear to have varied regionally and did not result in national famines (Sommarin 1917:39–41). We will further investigate the national and regional patterns in mortality and food prices after the mid-eighteenth century for Sweden in the second part of this chapter, focusing on one of the most severe famines in early modern Sweden, that of 1772/1773.

After the devastating famine during the final years of the seventeenth century, Finland also experienced famines in the eighteenth century, although they were less frequent and less severe than in the preceding century. Improved climatic conditions in general and the lower risk of coincident crop failures of rye and barley have been proposed as explanations for this change (Holopainen and Helama 2009: 220–221). Together with less spatial synchrony in this century, the large number of suggested years of famine, e.g., 26 years between 1749 and 1798, probably reflected local crop failures rather than famines (Holopainen and Helema 2009: 222; see also Jutikkala 1971 who argued that crop failures leading to excess mortality were rare between 1722 and 1850). Nevertheless, the pattern found for Sweden was also to a large extent valid for Finland, e.g., 1709–10 and the 1770s.

Nineteenth-century Finland was exposed to four periods of elevated mortality: 1808–09, 1832–33, 1857–58, and the famine of the late 1860s. The first of these, the 1808–09 excess

mortality, was primarily caused by warfare and the spread of disease, although a bad harvest in 1807 and the war itself both caused food shortages (Pitkänen 2002:76). The occupying army also provided rescue by importing food from Russia to relieve need, preventing a hunger-induced famine. The remaining years of high mortality were all caused by back-to-back harvest failures and hit large parts of Finland. In autumn 1832 and spring 1833, mortality increased substantially, doubling or tripling in affected areas, whereas the increase was somewhat smaller in 1857 (Pitkänen 2002:71–73). Finally, during the 1860s, consecutive harvest failures caused elevated mortality in both 1866 and 1867, but a dramatic increase occurred in 1868, with a CDR of approximately 78 and in some regions over 115, resulting in over 100,000 deaths (Kaukiainen 1984; Ó Gráda 2001; Pitkänen 2002:75).

For Denmark, Johansen (2002:61–63) lists all years from 1665 to 1775 with excess mortality over 30 per cent and discusses the possible causes. In 1710, the disastrous harvest of 1709 caused both very high prices and excess mortality. Johansen claims that the same happened in 1728–30, 1740–42 and 1763–64, although the CPI fluctuations for these years are quite modest. In the latter period, 1763–64, famine was accompanied by an influenza epidemic. For the year 1719, the cause of the high mortality level was not mentioned in the sources (Johansen 2002:63). The last famine in Denmark took place in 1786–87, when bad harvests in 1785 and 1786 and the subsequent high food prices led to excess mortality, with CDR of 31 and 28 per thousand, respectively (Johansen 2002:104). By permitting grain imports, Copenhagen was the least affected part of Denmark during this final famine.

The research on mortality crises in Norway has been very much centred on their causes in different parts of the country: are they due to starvation or epidemic diseases? The two major Norwegian mortality crises in the eighteenth century – 1742 and 1771–73 – were the subject of three doctoral theses in the late 1970s. Astrid Løvlien investigated the crises in 1742, comparing the landlocked, eastern parts of the country with the western parts where fishing played a substantial role for subsistence. She concluded that all factors point in the direction of a deficit crisis in the East. Conversely, epidemic diseases appeared to have played the greatest role in the West. At the same time, Løvlien questioned the relationship between malnutrition and disease in this period. The same diseases ravaged the East and the West, apparently independent of whether there was a food shortage or not (Løvlien 1977:125–126; 129–132).

Sølvi Sogner found that the demographic crisis in 1773 in eastern Norway was preceded by three consecutive years of bad harvests. This area was characterized by irregular grain supply (this was a deficit area even in normal years, as was most of Norway), high grain

prices (more than twice as high as normal), depression in many economic sectors, and violent epidemics of typhus and dysentery. This picture is complemented by Olav Aaras, who confirmed Sogner's finding that there was a major famine in the eastern part of the country in 1773. In the coastal districts in the West, there was also a food shortage after a long winter in 1771 and bad fishing and harvest failure in 1772, but people did not appear to have starved to death (Aaraas 1978:107, 111). Sogner finally compared the 1773 crisis with the crisis in 1809, which only hit the more urban part of eastern Norway. This demographic crisis appeared to have been primarily due to reduced trade and grain imports because of the continental blockade during the Napoleonic War, which led to high grain prices throughout Europe. Often, the cause of death was also violence and nutrition-related epidemics (Sogner 1976:108).

In June 1783, Mount Laki in southwestern Iceland erupted. This event was followed by the Móðuharðindin, the Mist Hardship, in which a poisonous fog hit most of the island. The grasslands did not recover for three years, which killed 80 percent of the livestock. The mortality in the subsequent famine was extremely high: 26 per cent of Iceland's population died during the two years 1784 and 1785 (Vasey 1991:343, 1996:371–372). It must be noted that despite the rich fishing waters surrounding the island, most Icelanders were in no position to substitute farming with fishing during the years of hardship. Fishing was tied to control of the land, and no fishing villages or activities were allowed to develop independently of the land rent system (Gunnarsson 1980: 14; 18).

Nordic famines c. 500–1875 – a summary

By defining famines as periods of excess mortality caused by a shortage of food or low purchasing power, we have not addressed the causes of famines but instead sought to list and present the major famines occurring throughout the Nordic countries during the last millennium. The sources available for this quest differ in nature and in content over time. Before the seventeenth century, evidence of famines relies mostly on chronicles providing narratives on lack of food, hunger and death. These sources, of course, make evaluations of when famines occurred and how severe they were highly uncertain. However, by using different sources and combining these with weather statements, previous research has proposed a number of such famines. From the seventeenth century onwards, the growing bureaucracies of the Nordic kingdoms produced more solid source material. By examining tax records, church registers and population censuses and combining them with harvest

evaluations and price data, we are better able to pinpoint the years of famine as well as their effects on mortality.

In general, crop failures seem to have appeared quite regularly during the last millennium, every 25 to 30 years and even more often than that during certain periods. The seventeenth century appears to have been particularly bad, leading us to also look at long-term climatic changes as an important factor in the northern periphery. It is clear that not all crop failures resulted in famines. The consequences of a crop failure could be highly severe, as in the case of the late seventeenth-century famine in Finland, the late eighteenth-century famine in Sweden, and the 1783 famine in Iceland. Potentially earlier famines also increased mortality to horrendous levels. However, history is so far silent about this subject apart from some contemporary statements such as the one on the late sixteenth century famine in Sweden. It is not clear why some years of crop failures and/or high prices did not result in famines. However, it appears that most often, more than one year of crop failure was needed to result in a famine with excess mortality. Moreover, over time, markets became more integrated and institutions distributing relief became more developed, leading to smaller effects from harvest failures, at least as long as they were regional. The differences between areas that normally produced a grain surplus, such as most of Denmark and Scania, and areas with production/consumption equilibrium or a grain deficit in normal years, were huge. In the latter cases, a primary cause of a mortality crisis could be bad harvests, followed by outbreaks of hunger-related diseases such as typhus and dysentery. In the former case, bad harvests could also result in higher death rates but the worst crisis years were the results of external factors such as plague and war-time diseases (Gadd, Johansen, Lindkvist 2011: 270, Larsson 2006: 121–128; Johansen 2002: 14, 45–46).

As a summary, table 1 lists the years in which famine most likely occurred in the Nordic countries between c. 500 and 1875. In reality, there were major differences within countries as well as in the magnitude of the effects of each famine in terms of mortality. During some years, entire countries and even the entire Nordic region appear to have been affected, but in most years, regions fared differently. The price indicators for Stockholm, Copenhagen and

Table 1. Famine years in the Nordic countries 536–1875, indications and prices

Years	Countries affected	Sw.	De.	No.
536–537	Denmark, Sweden, Norway	–	–	–
975–976	Iceland	–	–	–
1057–58	Iceland	–	–	–
1099–1101	Denmark	–	–	–
1118	Iceland	–	–	–
1196–98	Denmark	–	–	–
1225–26	Denmark	–	–	–
1300	Iceland	–	–	–
1310s	Denmark, Sweden	0.23	–	–
1447–48	Sweden	0.23	–	–
1556	Denmark	-0.11	0.16	0.04
1590–96	Denmark, Sweden, Finland, Norway	-0.02[1]	0.10[1]	0.30[1]
1597	Denmark, Sweden, Finland, Norway	0.29	0.11	-0.13
1602–03	Denmark, Sweden, Finland, Norway	0.08	0.24	-0.07
1633–34	Sweden	0.28	-0.01	-0.06
1650–52	Sweden	0.37	0.26	0.10
1675–77	Denmark[2], Sweden, Norway	0.21	0.22	0.08
1696–1700	Denmark[2], Sweden, Finland, Norway	0.32	0.51	0.21
1709–10	Denmark[2], Sweden, Finland	0.23	0.59	0.28
1717	Sweden	0.44	0.03	0.05
1719	Denmark[2]	0.66	0.04	0.05
1728–30	Denmark[2]	0.00	0.08	0.17
1740–43	Denmark[2], Sweden, Norway	0.12	-0.01	0.37
1763–64	Denmark[2]	0.40	0.10	0.08
1771–73	Sweden, Finland, eastern Norway	0.06	0.06	0.20
1783–87	Denmark, Iceland	0.03	0.13	0.06
1832–33	Finland	0.07	-0.01	0.05
1857–58	Finland	0.20	0.13	0.18
1866–68	Large parts of Finland, some counties in northern Sweden	0.06	0.07	0.08

Sources: See text and Figure 1.

Note: The price indicators show year within periods with highest deviation from trend (25-year moving average), logarithmic values.

[1] Average price for 1590–96, deviation from trend (25 year moving average), logarithmic values.

[2] Characterized by Johansen (2002: 61) as Danish years with high mortality probably connected to famine.

Oslo are somewhat dubious because we do not know how well, in each and every case, they reflect the fluctuations in the affected areas. The differences in outcome might of course be related to geographic factors such as soil conditions, climate, and location in terms of latitude or to economic-political reasons such as distance to the central power. The regional pattern in itself is also interesting in terms of our perception of how often an area was in fact hit by a famine.

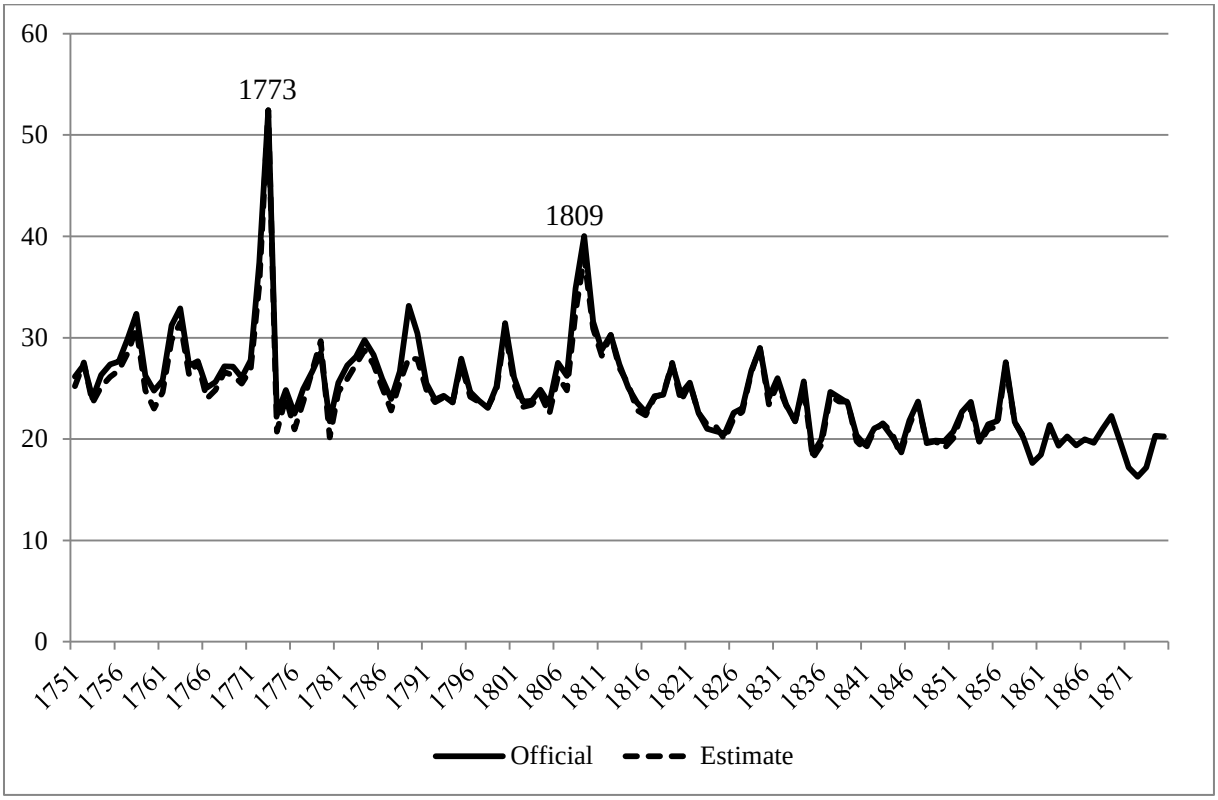
Famine in Sweden 1750–1875: national and regional patterns

We now turn to a disaggregated analysis to see whether we can find any event that looks like famine at the regional level in Sweden using county-level data. At that time, Sweden was comprised of 24 counties plus the city of Stockholm. The following analysis was based on the 24 counties excluding the capital city because of problems of under-recording mortality.

Data on mortality were derived from the Tabular commission, which published tables of vital events and population size for the period 1749–1859 (Sköld 2001), and from the official statistics (BiSOS) for the period 1860–75. County level data were published in BiSOS, while county-level summaries are not readily available for the period 1749–1859 from the Tabular commission. Instead, parish-level data were aggregated to the county level using data for homogenous geographical units (usually parishes or groups of parishes). The aggregation was made based on a data file supplied by the Demographic Database, Umeå University (DDB). The DDB has digitized all available parish-level tables from the Tabular commission. There are, however, also problems in this material both with missing tables and double counting, as well as with changes in geographical units (parishes or groups of parishes) over time. The total number of deaths in the DDB database is, for example, 20 percent lower than the official summary for the entire country. These problems require great caution when using the data for aggregative purposes and long-term studies.

In this study, we used mortality rates (number of deaths divided by the mean population in a year) based only on geographical units with full information for both deaths and population at risk. Because population counts were only available every three to five years, while demographic events were available annually, we used the last census provided it was not more than five years before the year of the deaths. Based on these data, we aggregated county-level crude death rates. To check the reliability of this method, Figure 2 shows the aggregation of a national series using the same methodology compared to the official national-level series. Overall, the correspondence between the two series is very good, indicating that the aggregation method is reliable. From the graph, it is also clearly evident that mortality at the national level increased substantially above normal during two periods, namely 1772/73, with 1773 as the peak year, and 1808/08 with 1809 as the peak year.

Figure 2. Comparison of the crude death rate according to official records (1751–1875) and estimated (1751–1875). Deaths per thousand population

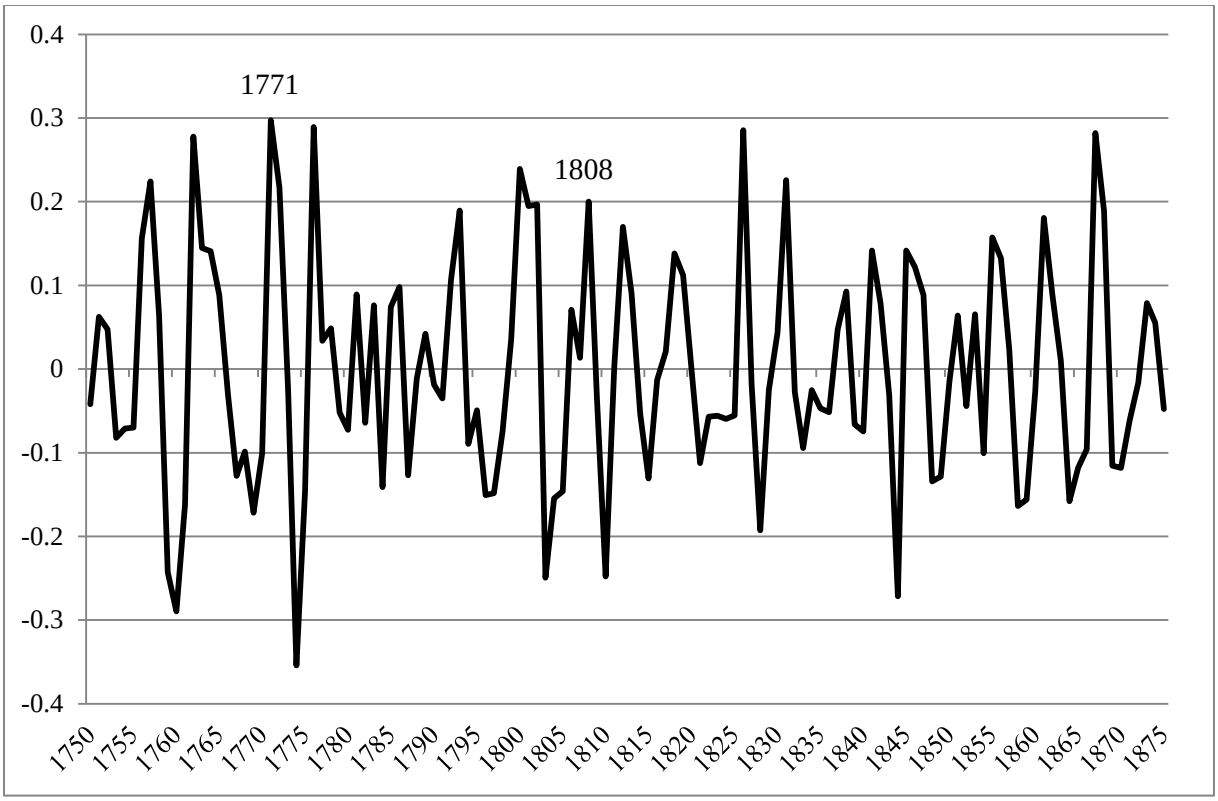


Source: Tabular commission, DDB Umeå University, own calculations (Estimate). SCB 1999: table 2.1 (Official).

Data on food prices were based on the series published by Jörberg (1972), which gave information for most, but not all, counties for the entire period under study. We used the price of rye as an indicator because this was an important bread grain during the period. The price data were converted into a comparable unit (Kronor/hectolitre) for the entire period. As we were primarily interested in the short-term fluctuations in prices and primarily large positive deviations from normal prices, we calculated the deviations from a Hodrick-Prescott smoothed trend of the log price (with a smoothing parameter of 6.25, see Ravn and Uhlig 2002).

Figure 3 shows the deviations from normal prices (HP-trend) on a log scale. There are a few years when rye prices increased approximately 30 percent or more above normal (log deviations greater than 0.25). One such year is 1771, when the price deviation at the national level was the largest during the entire period, amounting to roughly a 35 percent price increase. Thus it appears that the high mortality observed in 1772/73 must at least be partly connected to high food prices, which most likely led to hunger and hunger-related diseases causing excess mortality. This picture is also confirmed in the literature. In 1771, there were

Figure 3. Deviations from normal in rye prices in Sweden 1750–1875. Logarithmic values



Source: Jörberg 1972, own calculations.
Note: Deviations from Hodrick-Prescott trend of log values with a smoothing parameter of 6.25. National price series is an unweighted mean of county prices.

widespread crop failures following a very dry summer and heavy rain during late summer and fall. In 1772, the difficult conditions continued with crop failures in parts of middle and southern Sweden (Utterström 1957: I, 435; see also Larsson 2006: Ch. 4; SCB 1999:50). According to Castenbrandt (2012:68), approximately 50 percent of excess mortality in 1773 was due to dysentery, a disease usually considered to be highly nutrition dependent (see Livi-Bacci 1991:38; Larsson 2006:105–107), which further supports the link between the high prices of food and the high mortality levels.

Turning to the other mortality peak in 1809, figure 3 shows elevated rye prices in 1808, but not to any extreme levels (approximately 22 percent above normal). In fact, there are a number of years with similar or higher levels of food prices when mortality did not increase to high levels, which makes it less likely that the mortality peak in 1809 was primarily caused by widespread hunger, even though we know it was a year with regional crop failures (Utterström 1957: I, 435). Instead, excess mortality in these years has often been connected to

epidemic outbreaks of dysentery and typhus following the war with Russia and troop movements contributing to contagion (e.g., Castenbrandt 2012:31, 68).

Taken together, we could identify one case of likely famine in Sweden in the period after 1750, namely in 1772/73. In addition, mortality increased sharply in 1808/09 mainly as a result of epidemic outbreaks not primarily connected to high food prices and starvation, even though similar causes of death were involved and food prices were above normal. Later, these two periods of high mortality will be compared in terms of age-specific and seasonal mortality patterns.

Turning to the regional pattern, we looked at all counties for which we had data for both prices and mortality and identified years when high mortality coincided with high prices. We compared prices and mortality deviations from normal levels to detect periods when both rye prices and mortality rates were particularly high. We used 0.3 log units as the threshold, and famine years were defined as years when mortality was at least 0.3 log units above normal (roughly 35 percent), and the price of rye was at least 0.3 log units above normal the same year, the year before or two years before, to allow for the maximum influence of prices. Thus *food prices more than 35 percent above normal leading to crude death rates increasing by at least 35 percent within a two-year period* were considered to be famine years. This is a quite generous definition of famine, and years that do not qualify according to this definition, can safely be ruled out as famine years.

Using this definition, we found a limited number of regional famines (see Table 2; all data are available in the Appendix). What stands out from the table is that 1772/73 was a famine year in many regions, but not in all by far. Apart from this famine, there were regional famines in 1758 in Kopparberg County, 1763 in Göteborg and Bohus County, 1808 in Skaraborg, and 1812 in Östergötland County. In addition, there was also a famine in Jämtland in 1800 and 1809 and in Västerbotten in 1801, 1809, and 1868. The year 1773 saw excess mortality in Jämtland but not in Västerbotten (due to a lack of price data, we do not know the price levels in this period for these two counties). It is interesting to note that in 1809, there was only famine in Jämtland and Västerbotten, supporting the previous conclusion that the mortality peak in many places in this year was to a large extent the result of epidemic outbreaks not primarily connected to high food prices and widespread hunger, even though the dominant causes of death were partly the same as in the famine of 1772 (dysentery and other forms of diarrhoea; see Castenbrandt 2012:ch 3).

Table 2. Famine years in different counties in Sweden, 1750–1875

Stockholm			
Uppsala	1771/1773		
Södermanland	1771/1773		
Östergötland	1771/1773	1812/1812	
Jönköping			
Kronoberg			
Kalmar			
Kristianstad			
Malmöhus	1771/1772		
Halland			
Göteborg & Bohus	1762/1763		
Skaraborg	1771/1773	1806/1808	
Älvsborg			
Värmland	1772/1772,1773		
Örebro	1772/1773		
Västmanland	1771/1773		
Kopparberg	1756/1758	1771, 1772/1773	
Gävleborg	1771,1772/1773		
Västernorrland			
Jämtland[a]	?/1773	1800/1801	1808/1809
Västerbotten[a]	1800/1800	1808/1809	1867/1868

Note: Data available in the Appendix.
a. No continuous price data before 1796, and thus the existence of famines as measured here cannot be established before this date.

In 1758, mortality was high in many other counties as well, following crop failures in several counties in 1756 and 1757 (Utterström 1957: II, appendix 1) leading to food prices well above normal at the national level but not as high as in 1771 (see figure 4). However, only in Kopparberg County were conditions severe enough to qualify as a famine by our definition.

In 1763, the situation was similar following bad harvests in several parts of the country, including Bohuslän (part of Göteborg and Bohus County) (Utterström 1957: II, appendix 1). Several counties besides Göteborg and Bohus also observed mortality rates well above normal, for example, Värmland, Örebro, Kopparberg, Gävleborg, and Kalmar, who all showed crude death rates approximately 30 percent above normal. Nonetheless, it was only Göteborg and Bohus counties that showed a combination of rye prices and mortality at levels 35 percent above normal.

Table 3. Mortality comparisons. Swedish counties 1772/73 and 1808/09

A. Mortality rates (per thousand)

	1772			1773			1808			1809		
	(1) High	(2) Med/low	(3) (1)/(2)	(4) High	(5) Med/low	(6) (4)/(5)	(7) High	(8) Med/low	(9) (7)/(8)	(10) High	(11) Med/low	(12) (10)/(11)
Infants	339	283	1.20	367	300	1.22	252	237	1.06	239	216	1.11
Children (1–14)	39	21	1.88	68	26	2.62	44	17	2.54	48	24	2.05
Adults (25–49)	26	16	1.57	30	15	1.93	23	14	1.63	28	19	1.52
Old age (60–84)	133	101	1.32	151	85	1.79	130	88	1.48	133	98	1.36
Total	47	32	1.46	60	33	1.86	46	29	1.61	51	33	1.52
N (counties)	5	19		15	9		4	20		7	17	

B. Proportion of total deaths (per cent)

	1772			1773			1808			1809		
	(1) High	(2) Med/low	(3) (1)/(2)	(4) High	(5) Med/low	(6) (4)/(5)	(7) High	(8) Med/low	(9) (7)/(8)	(10) High	(11) Med/low	(12) (10)/(11)
Infants	17	21	0.82	13	23	0.57	15	23	0.66	12	18	0.70
Children (1–14)	26	20	1.34	34	25	1.39	30	18	1.63	29	21	1.36
Adults (25–49)	17	16	1.05	16	15	1.05	16	16	1.01	18	18	1.00
Old age (60–84)	22	26	0.86	20	21	0.96	21	27	0.80	23	24	0.92
N (counties)	5	19		15	9		4	20		7	17	

Note: High: High mortality. County-level mortality rate> 0.3 log points above HP-trend. Med/Low: Medium or low mortality. County-level mortality rates less than 0.3 log points above HP-trend.
Source: Tabular commission, Demographic Database, Umeå University

Table 4. Proportion of deaths by month. Swedish counties 1772/73 and 1808/09 (all ages) (%)

	1772			1773			1808			1809		
	(1) High	(2) Med/low	(3) (1)/(2)	(4) High	(5) Med/low	(6) (4)/(5)	(7) High	(8) Med/low	(9) (7)/(8)	(10) High	(11) Med/low	(12) (10)/(11)
Jan	5.6	6.7	0.83	7.5	10.2	0.74	4.6	7.6	0.61	9.2	11.3	0.81
Feb	6.2	8.0	0.77	6.7	9.4	0.71	4.5	7.3	0.62	8.9	9.4	0.94
Mar	9.1	9.9	0.93	7.3	8.8	0.83	6.1	8.8	0.69	8.3	10.4	0.80
Apr	9.8	9.0	1.09	8.3	9.1	0.91	5.4	9.5	0.56	9.3	12.4	0.75
May	13.7	10.3	1.33	8.7	10.4	0.84	4.9	9.1	0.54	7.0	9.6	0.73
Jun	9.6	8.3	1.15	7.9	6.6	1.19	4.1	7.0	0.59	7.4	7.4	1.00
Jul	7.9	7.3	1.09	9.4	6.4	1.48	3.9	6.1	0.64	5.9	5.9	0.99
Aug	8.5	7.9	1.08	13.1	9.6	1.36	11.7	6.0	1.95	8.6	5.3	1.63
Sep	7.9	7.5	1.06	13.8	9.8	1.41	27.2	7.9	3.44	16.9	6.9	2.45
Oct	8.3	7.3	1.14	7.9	8.5	0.93	15.2	9.8	1.55	8.9	7.3	1.21
Nov	7.2	8.8	0.82	4.6	5.4	0.85	6.3	9.1	0.69	5.0	6.7	0.74
Dec	6.0	9.0	0.67	4.8	5.9	0.81	6.0	11.7	0.52	4.6	7.3	0.64
Total	100.0	100.0		100.0	100.0		100.0	100.0		100.0	100.0	
Deaths	4865	11346		13008	6408		5062	17800		8215	17845	
Counties	5	19		15	9		4	20		7	17	

Source: Tabular commission, Demographic Database, Umeå University.

Finally in 1811 and 1812, crops failed in many parts of the country (Utterström 1957: II, appendix 1) including Östergötland, but only in Östergötland did mortality increase to famine levels. In some other counties, mortality was also elevated in this year, e.g., in the surrounding Södermanland and Jönköping counties, with levels approximately 17–20 percent above normal. There are also contemporary accounts supporting the finding of dire times in Östergötland in 1812 (Gullberg 1968:98).

A number of counties were also largely unaffected by the famine of 1773, which allowed us to compare the mortality development in a famine period between affected and non-affected regions. In addition, we also compared the more detailed mortality pattern in a period with high mortality not primarily caused by high food prices: 1808/09. Based on the CDR, we distinguish between counties with high mortality (>0.3 log units above the HP-trend) and medium/low mortality and compared the age-specific mortality between the two groups in the four different years. The results are displayed in Table 3.

As evident in panel A, mortality was higher in all age groups in high-mortality counties in all years. Overall mortality was 46 to 86 percent higher in high-mortality counties compared to low-mortality ones. We find the biggest difference for children: mortality in affected counties was 88–162 percent higher than in non-affected counties, while the corresponding spans were 6–20 percent for infants, 52–93 percent for working age adults, and 32–79 percent for the elderly. Looking at proportions of total deaths in each age group (panel B) confirms that children were the most affected of all age groups. High-mortality counties had 34–63 percent higher proportions of child deaths than low-mortality counties, while proportions of infant deaths were considerably lower in the high-mortality counties than in the low-mortality ones. In the famine year of 1773, the difference between affected and non-affected counties was considerably larger than in 1772, while the same difference could not be observed when comparing 1808 and 1809. This age pattern in mortality during crises is consistent with the typical age pattern of mortality in dysentery and other types of diarrhoea (see Castenbrandt 2012:76–79).

Table 4 shows a similar comparison regarding the seasonal pattern in mortality. In 1772, high-mortality counties showed a higher proportion of deaths in May, June and July compared to low mortality counties and lower proportions in the winter months. In the famine year of 1773, the proportion of deaths in July, August and September were the highest in the high-mortality counties relative to the low-mortality counties. This pattern is also consistent with the importance of dysentery for excess mortality, as dysentery often came in the summer and faded away during late fall (see Castenbrandt 2012:76–79; Larsson 2006:105–111). In 1808

and 1809, the difference in seasonality between high- and low-mortality counties was even larger, but the pattern was again expected given the importance of dysentery and typhoid fever related to epidemic outbreaks in the war camps (see Larsson 2006: 105–111).

The age-specific and seasonal patterns are thus quite similar in high-mortality counties during periods with a dominance of child deaths during the late summer and early autumn. This similarity can be explained by similar causes of death being responsible for excess mortality regardless of the underlying cause, famine or war (possibly in combination with under-nutrition). Taken together, we have only been able to identify one clear and widespread famine in Sweden in the period after 1750, namely 1773. In addition, there are a couple of more regional famines in years when larger parts of the country were also affected by crop failures, high prices and increasing mortality, but not to levels here considered to be famines. The low frequency of famines, despite frequent crop failures, in this period reflects a high degree of market integration in Sweden as well as in other parts of Europe (see, e.g., Bengtsson and Jörberg 1975; Persson 1999), which implies that crop failures in some regions were relieved through trade with other regions and that famine occurred only in rare instances when crops failed in large parts of the country at the same time.

Conclusion

To chart the occurrence of famine in history without hard evidence about mortality rates and food prices or output is, of course, a bold task. In this chapter, we have nevertheless aimed to address this issue, relying primarily on qualitative accounts based on contemporary reports and general historical writings. From the middle of the eighteenth century, we are on firmer ground thanks to the emergence of reliable population statistics and price data.

Our survey has indicated that widespread famine was always a rare occurrence in the Nordic countries, despite frequent crop failures. Great famines of national character that we may regard as confirmed were as follows: 536 in virtually all parts of the Nordic countries that were dependent on agriculture; 1696 in Finland; 1773 in large parts of Sweden, eastern Norway and Finland; Iceland in 1783; and Finland again in 1866–68. There were also a number of medieval and early modern years with contemporary reports of famine, but we have not been able to substantiate their extent and depth. However, we have been able to establish co-variations between famine reports and high consumer prices in Sweden for the following years: 1597, 1633–34, 1650–52, 1697–98 and 1717. To discover whether the national death rates concealed deeper crises at the disaggregated level, we turned to a regional

analysis going as far back as the data allowed. The results showed that 1773 probably was the last major famine in Sweden, although far from the entire country was affected. We recognized regional examples of increased mortality associated with high food prices, which also coincided with contemporary data on starvation and excess mortality. In addition to the 1773 famine, 1758, 1763, 1800, 1809, 1812 and 1868 were years when a regional famine could be detected, and in most cases, only one county was seriously affected, although both mortality and prices were elevated in other counties as well but not to famine levels.

Examining the age-specific mortality and seasonality pattern in the two years of mortality crises in Sweden, one hunger induced and one more due to epidemic outbreaks, we could show a highly similar pattern. This similarity could be explained by similar causes of death being involved: dysentery and typhus. All age groups were affected during the crisis, but children over the age of one were hardest hit. Mortality was highest during the summer and early fall as epidemics spread rapidly through water and food.

Large parts of the Nordic countries are close to the climatological edge where agriculture is possible, with cold winters and frost on the ground until March and April. How has this location affected the frequency and intensity of famines? On average, this location has not had much of an effect because population density in the long run tended to adapt to the carrying capacity of the land. The densely populated plains of Denmark and southern Sweden had almost continental climatological conditions, while areas less devoted to agriculture further north had considerably sparser populations. The survival strategies of these northern populations were more diversified, with fishing, gathering, and nomadic grazing as supplementary activities.

However, on occasions when sudden and severe external shocks occurred, the Nordic countries were harder hit than regions in more southern latitudes. The clearest example is perhaps 536, when a long period of agricultural expansion was interrupted by extreme and prolonged weather deterioration, which led to an estimated half of the Scandinavian population disappearing over the course of a few years. A local variant of this event was the Icelandic tragedy in 1783, which also had extreme death rates, but this event was due to the effects of volcanic activity on the island itself.

In most other years, and especially in the period after 1750, the market worked reasonably well to even out the supply of grain in different parts of the country, which lowered the impact of regional crop failures. A diversified agriculture also helped to minimize risks. At the same time, it should be stressed that mortality remained sensitive to short-term variations in grain prices and harvest outcomes well into the nineteenth century (e.g.,

Bengtsson and Ohlsson 1985; Bengtsson 2004, Bengtsson and Dribe 2005, Dribe, Olsson and Svensson 2012, 2014), and the same was true for fertility (Bengtsson and Dribe 2006, 2010). Thus, while people clearly were vulnerable to economic fluctuations, conditions rarely deteriorated to famine levels, which can be explained as a combination of a reasonably well-functioning market, a diversified economy, a population density in line with resource availability and the absence of serious political or war-related conditions conducive to famine.

References

Aakjaer, Svend (1936). Maal, vaegt og taxter i Danmark. In *Nordisk Kultur 30: Mått och vikt*, Stockholm: Albert Bonniers förlag, p. 255

Aaraas, Olav (1978). *Befolkningskrisa i Norge 1770–74: sult eller sykdom?* Hovudoppgåve, Universitetet i Bergen.

Abildgren, Kim (2010). Consumer prices in Denmark 1502–2007. *Scandinavian Economic History Review*, 58: 2–24

Bengtsson, T. (2004). Living standards and economic stress. In Bengtsson, T. et al. *Life Under Pressure. Mortality and Living Standards in Europe and Asia, 1700–1900*. Cambridge, MA: The MIT Press.

Bengtsson, T. and Dribe, M. (2005). New evidence on the standard of living in Sweden during the eighteenth and nineteenth centuries: Long-term development of the demographic response to short-term economic stress. In Allen, R. C., Bengtsson, T. and Dribe, M. (eds.) *Living Standards in the Past. New Perspectives on Well-Being in Asia and Europe*. Oxford: Oxford University Press.

Bengtsson, T. and Dribe, M. (2006). Deliberate control in a natural fertility population: Southern Sweden, 1766–1894. *Demography* 43:727–746.

Bengtsson, T. and Dribe, M. (2010). Economic stress and reproductive responses, in N. O. Tsuya, et al. (eds.) *Prudence and Pressure. Reproduction and Human Agency in Europe and Asia, 1700–1900*. Cambridge, MA: The MIT Press.

Bengtsson, T. and Ohlsson, R. (1985). Age-specific mortality and short-term changes in the standard of living: Sweden, 1751–1859. *European Journal of Population* 1: 309–326.

Bengtsson, T. and Jörberg, L. (1975). Market integration in Sweden during the 18th and 19th centuries spectral analysis of grain prices. *Economy and History* 18: 93–106.

Boisen, M. (1985). *Saxos Danmarks krönike 2*. Copenhagen: Peter Asschenfeldt's forlag.

Briffa, K. R., Jones, P.D., Schweingruber, F. H. and Osborn, T.J. (1998). Influence of volcanic eruptions on Northern Hemisphere summer temperature over the past 600 years. *Nature*, 393: 450–455.

Campbell, B. M. S. (2009). Four famines and a pestilence: harvest, price, and wage variations in England, 13th to 19th centuries. In Liljewall, B, et al (eds.) *Agrarhistoria på många sätt. 28 studier om människan och jorden*. Stockholm: Kungl. Skogs och lantbruksakademien, pp. 23–56.

Castenbrandt, H. (2012). *Rödsot i Sverige 1750–1900. En sjukdoms demografiska och medicinska historia*. Ph.D. dissertation, Department of Historical Studies, University of Gothenburg.

Degn, Ole (1981). *Rig og fattig i Ribe*. Aarhus: Universitetsforlaget.

Devroey, J.-P and Jaubert, A.N. (2011). Family, income and labour around the North Sea, 500–1000. In Vanhaute, E. et al. (eds.), *Making a Living. Family, Income and Labour. Rural Economy and Society in North-western Europe, 500–2000*, Turnhout: Brepols, pp. 5–44.

Dribe, M., Olsson, M. and Svensson, P. (2012). Was the manorial system an efficient insurance institution? Economic stress and demographic response in Sweden, 1749–1859. *European Review of Economic History* 16:292–310.

Dribe, M., Olsson, M. and Svensson, P. (2014). The agricultural revolution and the conditions of the rural poor: Sweden 1750–1860. Manuscript.

Dyrvik S., Mykland K., and Oldervoll J. (1976). *The demographic crises in Norway in the 17th and 18th centuries: some data and interpretations*. Bergen: Universitetsforlaget.

Edvinsson, R., Leijonhufvud and Söderberg, J. (2009), Väder, skördar och priser i Sverige. In Liljewall, B., et al. (eds.), *Agrarhistoria på många sätt. 28 studier om människan och jorden*. Stockholm: Kungl. Skogs och lantbruksakademien, pp. 115–136.

Edvinsson, R. and Söderberg, J. (2010). The evolution of Swedish consumer prices 1290–2008. In *Exchange rates, prices, and wages, 1277–2008*. Stockholm: Sveriges Riksbank/Ekerlids förlag, pp. 412–452

Gadd, C.-J., Johansen, H.C. & Lindkvist, T. (2011). Scandinavia 1000–1750. In Vanhaute, E. et al. (eds.), *Making a Living. Family, Income and Labour. Rural Economy and Society in North-western Europe, 500–2000*. Turnhout: Brepols, pp. 265–291.

Gräslund, Bo (2007). Fimbulvintern, Ragnarök och klimatkrisen år 536–537 e. Kr. In *Saga och sed. Kungl. Gustav Adolfs akademiens årsbok. Annales Academiae Regiae Gustavi Adolphi*, Uppsala : Kungl. Gustav Adolfs akademien, pp. 93–123

Grytten, Ola (2004) A Consumer Price Index for Norway 1516–2003. In *Historical monetary statistics for Norway*, Øyvind Eitrheim, Jan T. Klovland and Jan F. Qvigstad (eds.), Oslo: Norges Bank, 47–98.

Gräslund, B. and Price, N. (2012). Twilight of the gods? The 'dust veil event' of AD 536 in critical perspective. *Antiquity* 86: 428–443.

Gullberg, E. (1968). *Norrköpings kommunalstyrelse 1719–1862*. Norrköpings historia 8. Stockholm: P. A. Norstedts & söner.

Gunnarsson, Gísli (1980). A study of causal relations in climate and history. With an emphasis on the Icelandic experience: *Meddelande från Ekonomisk-historiska institutionen* 17. Lund University.

Heckscher, Eli F. (1933). En mätare på svenska folkets välståndsutveckling. Den mantalsskrivna befolkningen 1634–1820. *Historisk tidskrift* 365–402

Heckscher, Eli F. (1936). *Sveriges ekonomiska historia från Gustav Vasa*. Första delen, andra boken. Stockholm: Albers Bonniers förlag.

Holopainen, J. and Helama, S. (YEAR). Little ice age farming in Finland: preindustrial agriculture on the edge of the grim reaper's scythe. *Human Ecology* 37(2): 213–225.

Hybel, Nils and Poulsen, Bjørn (2007). *The Danish Resources c. 1000–1500*. Brill.

Johansen, H. C. (2002). *Danish Population History. 1600–1939*. Odense: University Press of Southern Denmark.

Johanson, V. F. (1924). *Finlands agrarpolitiska historia, En skildring av det finländska lantbrukets ekonomiska betingelser, I, från 1600-talet till år 1870.* Helsingfors: Lantbruksvetenskapliga samfundet.

Jutikkala, Eino (1955). The great Finnish famine in 1696–97. *Scandinavian Economic History Review* 3(1): 48–63.

Jutikkala, Eino (1971). The structure of mortality during catastrophic years in a pre-industrial society. *Population Studies* 25(2): 283–285.

Lappalainen, Mirkka (2014). Death and Disease During the Great Finnish Famine 1695–1697. *Scandinavian Journal of History*, 39 (4): 425–447.

Larsson, D. (2006). *Den dolda transitionen. Om ett demografiskt brytningsskede i det tidiga 1700-talets Sverige*. Ph.D. dissertation, Department of History, University of Gothenburg.

Livi-Bacci, Massimo (1991). *Population and Nutrition. An Essay on European Demographic History.* Cambridge: Cambridge University Press.

Lundh, C. (2003). Den regionala befolkningsstatistiken i Tabellverket – en databeskrivning. *Lund Papers in Economic History* 91. Lund University: Department of Economic History.

Løvlien, Astrid (1977). *Dødelighetskrisa på 1740-tallet: en sammenligning mellom to norske landsdeler*, Hovudoppgåve, Universitetet i Bergen.

Kaukiainen, Y. (1984). Harvest fluctuations and mortality in agrarian Finland (1810–1870). In Bengtsson, T., Fridlizius, G. and Ohlsson, R. (eds.) *Pre-Industrial Population*

Change. The Mortality Decline and Short-Term Population Movements, Stockholm: Almqvist & Wiksell International, pp. 235–254.

Kulturhistoriskt lexikon för Nordisk medeltid (KLNM).

Mykland, Knut (1977). *Gjennom nødsår og krig: 1648–1720, Norges historie*, bd 7. Oslo: Cappelen.

Myrdal, Janken (1999). *Jordbruket under feodalismen 1000–1700*. Stockholm: Natur och Kultur.

Myrdal, Janken (2011). Farming and feudalism. In Myrdal, J., and Morell, M. (eds.) *The Agrarian History of Sweden*. Lund: Nordic Academic Press, pp. 72–117.

Nairn, I. A., Shane, P.R., Cole, J.W., Leonard, G.J., Self, S., and Pearson, N. (2004). Rhyolite magma processes of the ~AD1315 Kaharoa eruption episode, Tarawera volcano, New Zealand. *Journal of Volcanology and Geothermal Research*, 131 (3–4): 265–294.

Ó Gráda, C. (2001). Markets and famines: Evidence form nineteenth-century Finland. *Economic Development and Cultural Change* 49(3): 575–590.

Ó Gráda, C. (2009). *Famine. A Short History*. Princeton: Princeton University Press.

Pedersen, Ellen Anne and Widgren, Mats (2011). Agriculture in Sweden. 800 BC–AD 100. In Myrdal, J., and Morell, M. (eds.) *The Agrarian History of Sweden*. Lund: Nordic Academic Press, pp. 46–71.

Persson, K. G. (1999). *Grain Markets in Europe 1500–1900. Integration and Deregulation*. Cambridge: Cambridge University Press.

Pitkänen, K. J. (2002). Famine mortality in nineteenth-century Finland: Is there a sex bias? In Dyson, T. and Ó Gráda, C. (eds.) *Famine Demography. Perspectives from the Past and Present*. Oxford: Oxford University Press, pp. 65–92.

Ravn, M. O. and Uhlig, H. (2002). On adjusting the Hodrick-Prescott filter for the frequency of observations. *Review of Economics and Statistics* 84(2): 371–376.

de Silva, Shanaka L. and Zielinski, Gregory A. (1998). Global influence of the AD 1600 eruption of Huaynaputina, Peru. *Nature*, 393: 455–458

Sköld, P. (2001). *Kunskap och kontroll. Den svenska befolkningsstatistikens historia*. Umeå: Demographic Database, Umeå University.

Sogner, Sølvi (1976). *Folkevekst og flytting: en historisk–demografisk studie i 1700-årenes Øst-Norge*, Oslo: Universitetsforlaget.

Solantie, R. (1988). Climatic conditions for the cultivation of rye with reference to the history of settlement in Finland. *Fennoscandia archaelogica* 5: 3–20.

Sommarin, Emil (1917). *Det skånska jordbrukets ekonomiska utveckling 1801 – 1914*. Del 1. Lund: Berlingska boktryckeriet.

Statistics Sweden 1999. *Befolkningsutvecklingen under 250 år*. *Historisk statistik för Sverige*. Stockholm: SCB.

Thorarinsson, Sigurdur (1944).*Tefrokronologiska studier på Island: Þjórsárdalur och dess förödelse*. Stockholm: Geografiska Annaler.

Tomasson, Richard (1977). A Millennium of Misery: The Demography of the Icelander. *Population Studies*, 31: 405–427.

Tvauri, Andres (2014). The impact of the climate catastrophe of 536–537 AD in Estonia and neighbouring areas. *Estonian Journal of Archaeology* 18(1): 30–56.

Utterström, G. (1955). Climatic fluctuations and population problems in early modern history. *Scandinavian Economic History Review 3(1):* 3–47.

Utterström, G. (1957). *Jordbrukets arbetare*. Stockholm: Tidens förlag.

Vasey, Daniel E. (1996). Population regulation, ecology, and political economy in preindustrial Iceland. *American Ethnologist* 23(2): 366–392.

Vasey, Daniel E. (1991). Population,agriculture, and famine. Iceland, 1784–1785. *Human Ecology* 19(3): 323–350.

Walford, Cornelius (1878). The famines of the world: past and present. *Journal of the Statistical Society of London* 41(3): 433–535.

Appendix. CDR and rye price deviations from Hodrick-Prescott trend (log values). Swedish counties 1772/73 and 1808/09

	Uppsala		**Södermanland**		**Östergötland**		**Jönköping**		**Kronoberg**		**Kalmar**		**Kristianstad**		**Malmöhus**	
	CDR	Price	CDR	Price	CDR	Price	CDR	Price	CDR	Price	CDR	Price	CDR	Price	CDR	Price
1750	-0.06	-0.09	-0.05	-0.13	-0.05	-0.02	0.01	-0.04	-0.12	-0.04	0.00	-0.01	-0.04	0.02	0.11	-0.02
1751	-0.08	0.16	-0.10	0.15	-0.01	0.06	-0.07	0.02	0.05	0.06	-0.14	0.07	0.10	0.04	0.07	0.11
1752	0.11	0.05	-0.13	0.05	0.02	-0.03	0.19	0.06	-0.07	0.01	0.01	-0.04	-0.04	-0.06	-0.10	-0.04
1753	-0.05	-0.20	0.04	-0.04	-0.04	-0.07	-0.11	-0.03	-0.03	-0.08	0.17	-0.09	-0.19	-0.16	-0.19	-0.21
1754	-0.08	-0.01	-0.01	-0.02	-0.16	-0.02	-0.07	-0.12	0.11	0.00	-0.06	-0.15	-0.07	0.00	0.00	-0.03
1755	-0.12	-0.09	-0.01	-0.15	0.02	-0.10	0.05	-0.04	0.16	-0.01	-0.13	0.03	0.29	0.06	0.20	0.06
1756	0.15	0.27	0.09	0.10	-0.11	0.25	-0.05	0.20	-0.05	0.08	-0.04	0.20	0.03	0.06	0.11	0.08
1757	-0.01	0.18	0.02	0.27	0.29	0.20	0.13	0.16	-0.12	0.14	0.22	0.29	-0.15	0.28	-0.11	0.32
1758	0.14	0.00	0.00	0.11	0.26	0.09	0.07	0.05	0.19	-0.03	0.01	0.13	0.20	0.06	0.09	0.18
1759	-0.01	-0.27	-0.01	-0.32	-0.19	-0.37	-0.09	-0.22	-0.08	-0.05	-0.04	-0.40	-0.13	-0.21	-0.09	-0.36
1760	-0.15	-0.29	-0.06	-0.30	-0.15	-0.30	-0.19	-0.30	-0.27	-0.26	-0.10	-0.33	-0.09	-0.32	-0.11	-0.40
1761	-0.05	0.01	0.05	-0.01	-0.13	-0.13	-0.02	-0.15	-0.06	-0.30	-0.14	-0.25	-0.11	-0.24	0.02	-0.22
1762	0.09	0.18	0.09	0.17	0.21	0.17	0.12	0.15	0.15	0.32	0.05	0.38	0.11	0.35	0.12	0.57
1763	0.04	0.10	-0.01	0.17	0.01	0.33	0.05	0.32	0.18	0.21	0.25	0.24	0.15	0.15	-0.03	-0.01
1764	-0.03	0.08	-0.10	0.07	-0.09	0.19	0.03	0.27	-0.02	0.18	0.04	0.18	-0.07	0.11	-0.03	0.06
1765	0.08	0.14	0.11	0.09	0.02	0.06	0.09	0.05	-0.01	0.04	-0.02	0.08	-0.01	0.18	0.03	0.25
1766	-0.02	0.03	-0.10	0.00	-0.01	-0.15	-0.14	-0.26	0.01	-0.12	-0.08	-0.17	-0.06	-0.13	-0.02	-0.08
1767	-0.01	-0.08	-0.01	0.05	0.06	-0.15	-0.07	-0.19	-0.06	-0.20	-0.08	-0.08	0.04	-0.19	-0.07	-0.30
1768	0.04	-0.11	0.16	-0.17	0.04	-0.08	0.01	0.01	-0.15	0.04	-0.14	-0.15	-0.09	-0.09	0.02	-0.01
1769	-0.06	-0.31	-0.10	-0.23	-0.11	-0.17	0.09	-0.03	0.10	-0.02	0.17	-0.13	0.00	-0.17	-0.05	-0.35
1770	-0.20	-0.12	-0.26	-0.15	-0.04	-0.19	-0.08	-0.09	-0.11	-0.01	-0.02	0.00	-0.06	0.04	-0.03	0.09
1771	-0.13	0.42	-0.03	0.30	-0.07	0.56	-0.16	0.21	-0.20	0.06	-0.19	0.21	0.08	0.29	0.05	0.44
1772	0.20	0.16	0.08	0.24	-0.03	0.16	0.00	0.25	0.31	0.05	0.13	0.18	0.23	0.18	0.35	0.15
1773	0.45	-0.06	0.61	-0.02	0.38	-0.02	0.58	-0.04	0.38	0.07	0.52	-0.04	0.11	-0.02	-0.10	-0.01

1774	-0.21	-0.26	-0.40	-0.35	-0.28	-0.44	-0.25	-0.42	0.01	-0.26	-0.41	-0.24	-0.33	-0.41	-0.22	-0.42
1775	-0.14	-0.15	-0.06	-0.10	0.13	-0.09	0.10	-0.17	-0.27	-0.15	-0.01	-0.13	0.16	0.00	-0.01	0.03
1776	-0.13	0.23	-0.10	0.19	-0.09	0.14	-0.26	0.18	-0.25	0.19	-0.07	0.08	-0.20	0.15	-0.02	0.02
1777	0.00	0.07	0.13	0.08	0.01	0.06	-0.14	0.16	-0.02	0.11	0.03	0.07	-0.11	-0.02	-0.05	0.05
1778	0.24	0.00	-0.16	0.09	-0.11	0.18	-0.04	0.17	0.21	0.08	-0.06	0.11	0.31	0.13	0.19	0.15
1779	0.10	-0.05	0.25	-0.09	0.20	-0.10	0.36	-0.04	0.09	0.04	0.22	0.05	0.12	-0.05	0.09	-0.10
1780	-0.30	-0.03	-0.10	-0.08	-0.04	-0.11	-0.23	-0.19	-0.14	-0.12	-0.09	-0.05	-0.25	-0.07	-0.18	-0.18
1781	0.01	0.15	-0.03	0.14	0.01	0.13	0.12	0.06	-0.05	-0.02	-0.08	-0.05	-0.07	0.05	-0.08	0.06
1782	-0.02	-0.12	0.05	-0.11	-0.06	-0.12	-0.19	-0.03	0.05	-0.05	0.03	-0.04	0.04	-0.04	0.03	0.08
1783	0.09	0.07	-0.05	0.09	-0.02	0.15	0.08	0.09	-0.25	0.07	-0.04	0.06	-0.24	0.07	-0.16	0.10
1784	0.16	-0.17	0.10	-0.15	0.01	-0.15	0.17	-0.15	0.18	-0.05	0.00	-0.06	0.25	-0.05	0.28	-0.13
1785	-0.07	0.09	-0.05	0.09	0.04	0.04	-0.03	0.06	0.28	0.02	0.17	0.01	0.25	0.02	0.06	0.09
1786	-0.04	0.10	0.01	0.07	0.02	0.12	-0.05	0.18	0.03	0.05	0.01	0.11	0.05	0.00	0.07	0.01
1787	-0.14	-0.13	-0.09	-0.15	-0.09	-0.11	0.01	-0.14	-0.24	-0.01	-0.14	-0.12	-0.18	-0.05	-0.13	-0.15
1788	0.06	-0.06	-0.03	0.00	-0.02	-0.04	-0.19	-0.03	-0.16	-0.06	-0.19	-0.01	-0.15	-0.01	-0.09	0.05
1789	-0.01	0.10	0.01	0.08	0.09	0.05	0.02	-0.03	0.10	-0.01	0.22	-0.01	-0.01	0.02	-0.01	0.08
1790	0.13	0.10	0.18	-0.01	0.07	-0.02	0.24	0.00	0.20	-0.07	0.11	-0.03	0.13	-0.03	0.06	-0.08
1791	0.03	-0.19	-0.01	-0.09	-0.04	-0.08	0.05	-0.02	-0.01	0.06	0.02	-0.04	0.00	0.00	-0.09	-0.05
1792	-0.11	0.16	-0.12	0.15	-0.15	0.15	-0.10	0.13	-0.12	0.12	-0.07	0.14	-0.02	0.08	0.11	0.14
1793	0.03	0.27	0.03	0.21	0.13	0.20	-0.07	0.22	-0.06	0.19	-0.09	0.21	-0.05	0.18	0.04	0.19
1794	-0.10	-0.18	-0.09	-0.13	-0.07	-0.05	-0.09	-0.13	-0.04	-0.07	-0.06	-0.06	0.04	-0.04	-0.08	-0.03
1795	0.15	-0.08	0.16	-0.08	0.14	-0.08	0.09	-0.09	0.15	-0.12	0.08	0.02	0.05	0.01	0.01	0.05
1796	0.05	-0.08	-0.03	-0.11	-0.09	-0.25	0.07	-0.21	-0.10	-0.15	0.11	-0.26	-0.09	-0.24	-0.11	-0.33
1797	-0.08	-0.17	-0.01	-0.16	-0.06	-0.14	-0.06	-0.10	0.04	-0.14	-0.05	-0.24	0.04	-0.19	0.06	-0.28
1798	-0.10	-0.13	-0.05	-0.07	0.04	-0.03	-0.10	0.01	-0.10	0.05	-0.06	0.04	-0.05	-0.12	-0.03	0.01
1799	-0.03	0.07	-0.12	0.01	-0.07	0.03	-0.02	0.04	0.10	-0.04	-0.08	0.04	0.09	0.10	0.17	0.08
1800	0.14	0.27	0.16	0.26	0.19	0.31	0.27	0.23	0.12	0.13	0.12	0.17	0.08	0.25	0.03	0.33
1801	0.09	0.23	0.07	0.24	0.02	0.22	0.04	0.16	-0.07	0.30	-0.03	0.24	-0.08	0.09	-0.12	0.08
1802	-0.06	0.15	0.06	0.16	-0.08	0.10	-0.10	0.23	0.01	0.18	0.04	0.25	0.00	0.15	-0.04	0.21
1803	0.02	-0.29	-0.02	-0.27	-0.05	-0.27	-0.07	-0.28	0.00	-0.25	-0.03	-0.28	-0.01	-0.01	0.01	-0.25

1804	-0.10	-0.15	-0.02	-0.12	0.04	-0.12	0.01	-0.19	-0.06	-0.18	0.09	-0.19	0.03	-0.18	0.00	-0.13
1805	-0.05	-0.13	-0.22	-0.16	-0.12	-0.18	-0.17	-0.16	-0.17	-0.17	-0.11	-0.18	-0.10	-0.15	-0.02	-0.09
1806	0.04	0.07	-0.02	0.08	0.08	0.14	0.02	0.14	0.07	0.15	0.06	0.15	0.03	0.08	-0.02	0.06
1807	-0.08	0.02	0.08	0.03	-0.01	0.00	-0.14	0.00	-0.02	0.01	-0.13	0.02	-0.11	-0.03	-0.05	-0.04
1808	-0.11	0.16	-0.05	0.23	-0.02	0.24	0.53	0.21	0.08	0.20	0.04	0.21	0.05	0.23	0.10	0.25
1809	0.22	0.01	0.13	-0.13	-0.03	-0.05	-0.24	-0.07	0.02	-0.17	0.09	-0.09	0.13	-0.13	0.14	-0.06
1810	0.12	-0.18	-0.01	-0.23	0.02	-0.45	-0.03	-0.37	0.06	-0.22	-0.06	-0.23	0.03	-0.20	-0.09	-0.33
1811	-0.07	0.05	-0.05	0.11	-0.12	0.01	-0.06	-0.02	0.05	0.10	-0.01	-0.05	0.01	-0.10	-0.06	0.02
1812	0.10	0.10	0.18	0.11	0.33	0.35	0.16	0.37	0.08	0.17	0.08	0.18	0.01	0.31	0.04	0.24
1813	0.02	0.02	0.06	0.08	-0.03	0.10	0.00	0.12	-0.18	0.06	0.04	0.09	-0.05	-0.01	0.03	0.05
1814	-0.14	-0.08	-0.15	-0.08	-0.04	-0.09	0.01	-0.08	0.05	-0.02	0.02	-0.02	0.06	-0.09	0.09	-0.05
1815	-0.04	-0.15	-0.03	-0.12	-0.07	-0.07	-0.11	-0.16	-0.15	-0.06	-0.03	-0.04	-0.11	-0.02	-0.15	-0.10
1816	-0.07	0.02	-0.06	-0.01	-0.09	-0.11	-0.14	-0.01	0.04	-0.03	-0.14	-0.04	-0.09	-0.03	-0.04	0.00
1817	0.00	0.09	0.01	0.05	0.06	0.05	-0.01	-0.06	-0.02	-0.09	-0.02	-0.03	0.02	0.07	-0.05	-0.04
1818	-0.10	0.16	-0.07	0.15	-0.10	0.19	-0.04	0.14	0.06	0.03	0.03	0.09	0.04	0.09	0.04	0.15
1819	0.13	0.07	0.08	0.14	0.04	0.19	0.29	0.19	0.18	0.20	0.07	0.13	0.11	0.14	0.09	0.15
1820	0.08	0.03	0.05	0.03	-0.04	-0.06	-0.03	-0.01	-0.18	0.01	-0.07	0.01	-0.14	-0.01	-0.05	-0.02
1821	0.17	-0.15	0.09	-0.20	0.23	-0.26	-0.01	-0.15	0.05	-0.08	0.17	-0.02	0.20	-0.09	0.13	-0.10
1822	-0.02	-0.04	-0.02	-0.12	0.04	-0.15	0.02	-0.08	0.02	-0.02	-0.03	-0.14	0.00	-0.01	-0.05	-0.01
1823	-0.12	0.00	0.00	-0.04	-0.07	0.07	-0.08	-0.06	-0.01	-0.07	-0.01	-0.04	0.00	-0.07	0.01	-0.03
1824	-0.11	-0.22	-0.08	0.01	-0.08	-0.01	0.02	-0.03	0.01	-0.06	-0.06	-0.04	-0.09	-0.21	-0.03	-0.25
1825	-0.10	0.01	-0.05	-0.07	-0.15	-0.09	-0.10	-0.06	-0.10	-0.08	-0.11	-0.13	-0.08	-0.14	-0.08	-0.12
1826	0.10	0.32	-0.08	0.34	0.01	0.35	0.05	0.30	0.07	0.20	-0.10	0.28	-0.07	0.39	-0.06	0.46
1827	-0.05	-0.06	-0.12	-0.05	-0.06	-0.08	-0.11	0.15	-0.08	0.01	0.02	0.08	-0.01	0.10	0.03	-0.04
1828	0.06	-0.14	0.24	-0.30	0.10	-0.11	0.00	-0.41	-0.05	-0.07	0.19	-0.19	-0.01	-0.25	-0.02	-0.19
1829	0.12	0.02	0.14	0.04	0.21	-0.08	0.24	-0.06	0.14	-0.10	0.20	-0.04	0.19	0.00	0.12	-0.03
1830	-0.04	0.00	-0.07	0.05	-0.06	0.06	-0.04	0.09	0.01	0.02	-0.16	0.03	-0.05	0.05	-0.11	0.07
1831	0.03	0.22	-0.02	0.22	0.00	0.24	-0.06	0.28	0.03	0.26	-0.06	0.19	0.11	0.26	0.16	0.32
1832	0.03	-0.03	0.02	-0.01	0.02	-0.11	-0.08	-0.02	0.00	-0.02	0.05	-0.03	0.11	-0.11	0.08	-0.05
1833	-0.08	-0.14	-0.11	-0.14	-0.09	-0.12	0.02	-0.10	0.05	-0.10	0.01	-0.07	-0.05	-0.13	0.04	-0.21

1834	0.06	0.00	0.06	0.01	0.10	0.13	0.23	-0.06	-0.03	0.04	0.02	0.02	-0.13	-0.03	-0.11	-0.03
1835	-0.18	-0.01	-0.12	-0.05	-0.12	-0.13	-0.21	-0.06	-0.13	-0.07	-0.11	-0.02	-0.19	-0.01	-0.18	-0.03
1836	-0.12	-0.07	-0.04	-0.08	-0.18	-0.09	-0.08	-0.07	-0.07	-0.09	-0.11	-0.08	0.00	-0.04	-0.02	-0.06
1837	0.17	0.00	0.12	0.01	0.18	0.04	0.11	0.04	0.11	0.07	0.16	0.01	0.10	0.15	0.03	0.14
1838	0.13	0.11	0.18	0.13	0.05	0.17	-0.01	0.19	0.07	-0.01	0.00	0.13	0.14	0.02	0.10	0.06
1839	0.12	-0.07	-0.06	-0.05	0.03	-0.12	0.04	-0.12	-0.01	-0.06	0.01	-0.12	-0.02	-0.13	0.11	-0.14
1840	-0.15	-0.06	-0.09	-0.09	-0.09	-0.10	0.00	-0.12	-0.05	-0.01	0.03	-0.10	-0.09	-0.09	-0.10	-0.11
1841	-0.08	0.21	-0.08	0.22	-0.12	0.20	-0.13	0.11	-0.02	0.17	-0.05	0.20	0.02	0.20	-0.11	0.24
1842	0.04	-0.01	0.01	0.00	0.18	0.12	0.08	0.20	0.04	0.13	-0.06	0.10	0.01	0.16	0.06	0.15
1843	-0.01	-0.03	0.09	-0.06	0.05	-0.05	0.07	0.04	-0.03	-0.09	0.03	-0.07	0.02	-0.10	0.06	-0.13
1844	-0.07	-0.32	-0.02	-0.27	0.03	-0.33	0.05	-0.36	0.02	-0.20	0.06	-0.32	-0.01	-0.33	0.00	-0.34
1845	-0.07	0.28	-0.13	0.24	-0.17	0.18	-0.14	0.03	-0.09	0.04	-0.20	0.20	-0.10	0.10	-0.08	0.19
1846	0.20	0.09	0.09	0.10	-0.03	0.14	0.05	0.10	0.07	0.12	0.11	0.08	0.04	0.23	0.08	0.23
1847	0.05	0.06	0.00	0.05	0.06	0.05	0.05	0.20	0.11	0.11	0.11	0.16	0.20	0.09	0.11	0.09
1848	-0.09	-0.19	0.07	-0.15	0.00	-0.16	-0.06	-0.15	-0.03	-0.17	0.09	-0.19	-0.13	-0.19	-0.15	-0.16
1849	0.02	-0.11	0.03	-0.14	0.10	-0.16	0.05	-0.12	-0.08	-0.06	-0.08	-0.14	0.02	-0.15	-0.06	-0.19
1850	-0.06	0.02	-0.04	0.04	-0.08	0.08	-0.11	-0.05	-0.08	-0.05	-0.06	-0.01	-0.17	0.04	-0.04	-0.08
1851	-0.02	0.01	0.02	0.03	-0.04	0.06	0.03	0.10	0.08	0.10	-0.08	0.07	-0.02	0.06	0.01	0.12
1852	0.04	-0.01	0.00	-0.05	0.09	-0.05	0.01	0.04	0.11	0.02	-0.02	-0.06	0.14	-0.09	0.17	-0.12
1853	0.00	0.08	-0.12	0.07	-0.01	0.03	0.05	0.00	-0.02	0.02	0.16	0.07	0.11	0.12	0.09	0.17
1854	0.00	-0.10	-0.14	-0.09	-0.16	-0.11	-0.06	-0.12	-0.13	-0.16	-0.04	-0.11	-0.12	-0.10	-0.15	-0.05
1855	-0.12	0.23	0.08	0.24	-0.06	0.19	-0.16	0.08	-0.03	0.10	-0.09	0.19	-0.03	0.22	-0.02	0.28
1856	-0.06	0.12	0.05	0.12	0.11	0.16	-0.19	0.15	0.02	0.15	-0.03	0.11	-0.06	0.03	-0.07	0.01
1857	0.31	-0.05	0.16	-0.03	0.25	0.05	0.78	0.11	0.02	0.08	0.03	0.04	0.14	-0.04	0.04	-0.05
1858	-0.01	-0.19	0.01	-0.20	-0.03	-0.22	-0.07	-0.12	0.14	-0.13	0.17	-0.17	0.03	-0.06	0.05	-0.18
1859	0.01	-0.16	-0.06	-0.18	0.00	-0.21	-0.19	-0.22	0.03	-0.18	0.14	-0.21	-0.01	-0.18	0.08	-0.15
1860	-0.13	-0.01	-0.13	0.01	-0.14	-0.05	-0.19	-0.09	-0.10	-0.05	-0.20	0.02	0.00	0.01	0.00	0.06
1861	-0.02	0.27	-0.06	0.26	-0.11	0.29	-0.09	0.20	-0.11	0.15	-0.18	0.20	-0.11	0.19	-0.12	0.21
1862	0.02	0.10	0.15	0.10	0.01	0.11	0.15	0.09	0.24	0.14	0.02	0.09	0.10	0.10	0.07	0.07
1863	-0.03	0.01	0.01	-0.01	0.10	0.02	-0.05	0.09	-0.10	0.05	0.14	0.01	-0.11	-0.06	-0.10	-0.10

1864	-0.05	-0.26	0.01	-0.22	0.04	-0.25	0.01	-0.15	-0.04	-0.18	0.00	-0.21	0.07	-0.25	0.05	-0.22
1865	0.18	-0.16	-0.06	-0.17	-0.15	-0.16	0.01	-0.14	-0.09	-0.09	-0.07	-0.16	-0.04	-0.07	0.01	-0.01
1866	-0.04	-0.07	-0.06	-0.09	0.10	-0.08	-0.03	-0.18	-0.07	-0.11	0.03	-0.05	-0.05	-0.06	-0.06	-0.04
1867	-0.03	0.33	0.03	0.34	0.00	0.32	-0.04	0.28	-0.01	0.21	-0.06	0.34	-0.07	0.36	-0.08	0.31
1868	0.03	0.27	0.04	0.23	0.03	0.23	0.05	0.29	0.10	0.18	0.00	0.20	0.05	0.22	0.14	0.12
1869	-0.10	-0.21	0.10	-0.19	0.08	-0.15	0.08	-0.13	0.22	-0.09	0.12	-0.15	0.29	-0.18	0.17	-0.15
1870	0.01	-0.11	-0.01	-0.14	-0.01	-0.18	0.12	-0.13	0.03	-0.08	0.05	-0.19	-0.02	-0.13	0.00	-0.10
1871	0.09	-0.06	-0.02	-0.03	-0.08	-0.05	-0.09	-0.08	-0.08	-0.08	-0.03	0.01	-0.10	-0.06	-0.14	-0.05
1872	0.03	-0.02	-0.15	0.01	-0.07	0.05	-0.02	-0.02	-0.09	-0.03	-0.07	0.00	-0.07	-0.08	-0.13	-0.03
1873	-0.16	0.10	-0.11	0.10	-0.05	0.06	-0.10	0.03	-0.08	0.09	-0.08	0.05	-0.09	0.13	0.02	0.12
1874	0.06	0.03	0.21	0.02	0.12	0.06	0.00	0.09	-0.01	0.07	0.08	0.04	-0.01	0.07	0.05	0.04
1875	0.03	-0.04	-0.03	-0.04	-0.01	-0.06	0.06	-0.03	0.08	-0.06	0.00	-0.03	0.09	-0.06	0.02	-0.06

	Halland		**Göteborg & Bohus**		**Älvsborg**		**Värmland**		**Örebro**		**Västmanland**		**Kopparberg**		**Gävleborg**		**Västernorrland**	
	CDR	Price	CDR	Price	CDR	Price	CDR	Price	CDR	Price	CDR	Price	CDR	Price	CDR	Price	CDR	Price
1750	-0.02	0.09	0.02	0.08	0.14	0.03	0.17	-0.09	0.07	-0.12	-0.13	-0.09	-0.06	-0.12	-0.19	-0.09	0.02	0.03
1751	-0.01	-0.11	0.03	-0.03	0.05	-0.07	-0.02	0.13	-0.04	0.15	-0.06	0.10	0.00	0.18	-0.03	0.12	-0.29	-0.10
1752	-0.13	0.04	0.10	-0.01	-0.07	0.02	-0.06	0.05	-0.20	0.03	0.13	0.05	0.32	0.09	0.50	0.08	0.11	0.18
1753	0.03	-0.05	-0.06	-0.09	-0.11	0.02	-0.10	-0.07	-0.11	-0.05	-0.09	-0.12	-0.15	-0.17	-0.14	-0.07	0.21	-0.11
1754	-0.01	-0.07	-0.07	-0.06	0.13	-0.07	0.04	-0.09	0.23	-0.03	-0.07	0.00	-0.10	-0.08	-0.06	-0.16	-0.06	-0.02
1755	0.16	0.06	-0.07	-0.06	0.02	-0.05	0.00	-0.08	-0.01	-0.09	-0.03	-0.09	-0.15	-0.17	-0.20	-0.17	0.00	-0.07
1756	-0.06	-0.05	-0.08	0.10	-0.12	0.15	0.06	0.14	-0.09	0.11	0.07	0.26	0.04	0.37	-0.06	0.29	-0.05	0.03
1757	-0.03	0.28	0.03	0.19	0.00	0.17	-0.05	0.24	0.10	0.19	0.05	0.34	0.03	0.20	0.05	0.31	0.00	0.25
1758	0.12	0.06	0.14	0.12	0.14	0.06	0.20	0.00	0.29	0.12	0.16	-0.07	0.34	0.10	0.24	0.08	0.00	-0.04
1759	-0.04	-0.18	0.24	-0.14	0.01	-0.21	0.00	-0.16	-0.20	-0.21	-0.14	-0.36	-0.05	-0.33	-0.02	-0.43	-0.05	-0.19
1760	-0.12	-0.30	-0.27	-0.28	-0.23	-0.41	-0.21	-0.36	-0.21	-0.43	-0.10	-0.31	-0.23	-0.40	-0.02	-0.34	0.00	-0.10
1761	-0.10	-0.25	-0.19	-0.26	-0.02	-0.18	-0.13	-0.16	-0.14	-0.13	-0.07	-0.23	-0.24	-0.06	-0.28	0.03	0.04	-0.09

1762	0.08	0.41	0.03	0.43	0.16	0.43	0.03	0.32	0.17	0.28	0.09	0.32	0.10	0.26	0.00	0.33	0.06	0.03
1763	0.19	0.18	0.31	0.09	0.11	0.23	0.28	0.19	0.24	0.19	0.09	0.21	0.28	0.16	0.28	0.06	-0.01	0.06
1764	-0.01	0.20	0.07	0.14	0.08	0.20	-0.01	0.18	-0.10	0.16	0.00	0.14	-0.17	0.12	-0.02	0.05	-0.12	0.20
1765	-0.04	-0.04	-0.04	-0.02	-0.10	-0.08	0.09	0.06	0.01	0.13	0.07	0.15	0.15	0.16	0.04	0.14	-0.05	0.22
1766	-0.20	-0.09	-0.16	-0.04	-0.14	-0.15	-0.14	-0.19	-0.09	-0.01	-0.10	-0.03	-0.08	0.04	-0.14	-0.01	0.19	0.16
1767	0.09	-0.15	-0.19	-0.07	-0.05	-0.07	-0.19	-0.05	0.02	-0.18	0.09	-0.10	-0.01	-0.21	-0.03	-0.11	0.04	-0.33
1768	0.18	-0.12	0.17	-0.20	0.21	-0.13	-0.10	0.02	0.09	-0.07	-0.08	-0.11	0.10	-0.16	0.22	-0.12	-0.15	-0.17
1769	-0.32	-0.07	-0.07	-0.15	-0.26	-0.06	0.25	-0.15	-0.07	-0.20	-0.02	-0.26	-0.08	-0.22	-0.18	-0.23	-0.01	-0.17
1770	0.07	-0.05	-0.05	-0.10	-0.07	-0.14	-0.24	-0.20	-0.26	-0.20	-0.22	-0.16	-0.20	-0.09	-0.13	-0.16	0.10	-0.03
1771	0.09	0.23	-0.08	0.34	-0.07	0.27	-0.27	0.13	-0.04	0.26	-0.18	0.37	-0.24	0.33	-0.24	0.38	0.09	0.24
1772	0.03	0.12	0.23	0.24	0.30	0.19	0.31	0.34	-0.07	0.34	0.13	0.28	0.06	0.31	0.04	0.32	-0.19	0.28
1773	0.12	0.02	0.24	0.02	0.46	0.08	0.80	0.15	0.95	0.06	0.95	-0.05	1.15	-0.03	0.89	-0.10	0.17	-0.10
1774	-0.01	-0.32	0.07	-0.32	-0.18	-0.31	-0.16	-0.42	-0.25	-0.42	-0.45	-0.36	-0.51	-0.38	-0.32	-0.26	-0.11	-0.22
1775	0.04	-0.01	-0.08	-0.20	-0.10	-0.24	-0.27	-0.28	-0.27	-0.23	-0.22	-0.14	-0.27	-0.12	-0.19	-0.19	-0.02	-0.21
1776	-0.14	0.12	-0.23	0.30	-0.28	0.18	-0.22	0.28	-0.20	0.26	-0.20	0.24	-0.25	0.23	-0.28	0.21	-0.02	0.17
1777	-0.19	0.04	-0.16	0.00	-0.06	0.08	-0.19	0.12	-0.07	0.09	0.07	0.06	-0.09	0.03	0.14	0.06	0.07	0.15
1778	0.19	0.10	-0.03	0.03	0.01	0.08	0.14	0.10	0.04	0.10	0.04	0.02	0.40	0.03	0.11	-0.01	0.01	0.01
1779	0.14	-0.05	0.14	-0.08	0.22	-0.02	0.25	-0.13	0.33	-0.06	0.23	-0.07	0.19	-0.09	0.19	0.00	0.00	-0.05
1780	-0.31	-0.07	-0.01	-0.06	-0.26	-0.07	-0.24	-0.10	-0.23	-0.08	-0.15	0.04	-0.35	-0.03	-0.18	-0.05	-0.22	-0.01
1781	0.11	0.02	0.00	0.06	0.05	0.12	-0.22	0.15	-0.05	0.10	0.03	0.15	-0.03	0.19	-0.13	0.12	0.01	0.03
1782	-0.12	0.00	0.05	0.06	0.09	-0.06	0.00	-0.09	0.05	-0.09	-0.06	-0.20	-0.02	-0.16	-0.04	-0.08	0.30	-0.05
1783	0.06	-0.02	0.06	-0.02	0.23	0.02	0.47	0.13	0.09	0.07	-0.04	0.03	0.09	0.13	0.15	0.05	-0.06	0.03
1784	0.17	-0.04	0.04	-0.09	-0.08	-0.19	0.00	-0.19	0.02	-0.19	0.13	-0.15	0.17	-0.16	0.03	-0.15	-0.23	0.02
1785	0.10	0.10	0.04	0.02	-0.05	0.14	-0.14	0.06	-0.13	0.11	-0.04	0.13	-0.05	0.07	0.14	0.06	0.20	-0.04
1786	0.00	0.01	-0.19	0.12	-0.01	0.12	-0.04	0.13	0.01	0.16	-0.01	0.15	-0.11	0.05	-0.22	0.02	0.02	0.00
1787	-0.15	-0.17	-0.19	-0.08	-0.16	-0.12	0.02	-0.12	0.03	-0.17	-0.10	-0.14	-0.05	-0.07	-0.24	-0.01	-0.28	-0.02
1788	-0.15	0.06	0.09	-0.02	-0.08	-0.04	0.06	0.06	0.05	-0.03	0.08	-0.06	0.13	-0.10	0.32	-0.04	0.23	-0.01
1789	0.16	0.12	0.28	0.00	0.17	-0.01	-0.07	-0.08	-0.03	0.06	-0.02	0.02	-0.03	0.06	-0.01	0.05	0.21	0.01
1790	-0.02	-0.08	0.06	0.02	0.12	0.00	-0.01	-0.03	0.03	-0.01	0.05	0.07	-0.09	0.05	-0.09	0.04	-0.28	0.01
1791	0.02	-0.09	-0.14	-0.05	-0.01	0.06	-0.04	-0.03	-0.04	-0.07	0.03	-0.09	-0.02	-0.02	0.17	-0.05	-0.02	0.02

1792	-0.02	0.09	-0.01	0.01	-0.01	0.06	0.07	0.08	-0.03	0.13	-0.15	0.13	0.06	0.11	0.00	0.03	0.15	0.05
1793	-0.07	0.16	-0.20	0.20	-0.14	0.16	-0.05	0.19	0.10	0.21	0.05	0.24	0.00	0.18	-0.09	0.23	-0.02	0.15
1794	0.01	0.04	0.10	-0.04	0.01	-0.10	0.00	0.06	-0.18	-0.07	-0.07	-0.12	-0.02	-0.15	-0.05	-0.13	-0.07	-0.13
1795	0.12	0.05	0.15	0.06	0.15	-0.07	0.13	-0.22	0.11	-0.12	0.24	-0.12	0.04	-0.08	0.11	-0.02	0.08	0.01
1796	-0.09	-0.25	-0.06	-0.19	-0.03	-0.14	-0.07	-0.11	0.08	-0.17	0.01	-0.11	0.10	-0.07	-0.09	-0.12	-0.07	-0.11
1797	0.02	-0.23	-0.02	-0.24	-0.07	-0.14	0.01	-0.13	-0.07	-0.11	-0.15	-0.17	-0.13	-0.10	-0.02	-0.18	-0.10	-0.09
1798	-0.14	-0.10	-0.18	-0.15	-0.16	-0.05	-0.18	-0.03	-0.04	-0.06	-0.07	-0.09	-0.09	-0.12	-0.12	-0.18	-0.04	-0.17
1799	-0.02	0.11	0.08	0.19	0.02	0.07	-0.07	0.04	-0.07	0.04	-0.09	0.08	-0.11	0.01	-0.01	0.13	0.04	0.02
1800	0.23	0.29	0.14	0.24	0.24	0.31	0.26	0.22	0.29	0.29	0.28	0.27	0.27	0.18	0.37	0.25	0.25	0.20
1801	0.04	0.17	0.13	0.18	0.06	0.10	0.10	0.16	-0.11	0.14	-0.12	0.18	0.17	0.22	-0.09	0.19	0.05	0.24
1802	-0.11	0.16	-0.11	0.13	-0.10	0.18	0.01	0.19	-0.09	0.15	-0.04	0.16	-0.12	0.19	0.01	0.20	-0.12	0.28
1803	-0.08	-0.21	-0.15	-0.22	-0.13	-0.25	-0.02	-0.26	0.02	-0.25	0.20	-0.29	-0.07	-0.22	-0.07	-0.26	0.00	-0.29
1804	0.01	-0.17	0.10	-0.15	0.10	-0.19	-0.10	-0.10	0.09	-0.15	-0.14	-0.15	-0.09	-0.15	0.01	-0.13	-0.09	-0.16
1805	0.02	-0.12	-0.04	-0.16	0.02	-0.17	-0.16	-0.23	-0.13	-0.15	-0.03	-0.12	-0.14	-0.11	-0.11	-0.16	-0.04	-0.15
1806	0.20	0.05	-0.13	0.07	-0.08	0.12	-0.01	0.08	0.07	0.12	-0.01	0.12	0.02	0.02	-0.12	0.02	-0.04	0.03
1807	-0.23	0.01	-0.19	0.01	-0.30	0.01	-0.18	0.09	-0.18	0.08	-0.11	0.03	0.06	0.07	-0.07	0.04	-0.08	0.02
1808	-0.01	0.18	0.38	0.23	0.35	0.25	0.02	0.28	0.00	0.21	-0.04	0.21	-0.19	0.15	0.00	0.18	-0.10	0.14
1809	0.05	-0.08	0.21	-0.03	0.08	-0.07	0.37	-0.15	0.17	-0.14	0.27	-0.10	0.45	-0.02	0.50	-0.01	0.25	0.09
1810	0.04	-0.22	-0.12	-0.26	-0.02	-0.30	0.26	-0.33	0.11	-0.31	0.00	-0.32	0.05	-0.16	-0.05	-0.22	0.04	-0.15
1811	-0.03	0.03	-0.17	-0.10	0.04	-0.06	-0.20	0.01	-0.03	0.09	-0.06	0.12	-0.20	-0.07	-0.17	0.04	0.34	-0.05
1812	0.04	0.22	0.04	0.24	-0.07	0.27	-0.04	0.25	0.07	0.21	0.05	0.15	-0.03	0.14	-0.08	0.16	-0.24	0.11
1813	-0.03	0.05	-0.06	0.19	-0.06	0.20	0.06	0.17	-0.08	0.08	-0.01	0.07	0.17	0.07	0.12	0.02	-0.05	0.07
1814	0.07	-0.03	0.19	-0.02	0.11	-0.08	-0.14	-0.11	-0.14	-0.12	-0.07	-0.09	-0.15	-0.04	-0.06	-0.07	-0.04	-0.08
1815	-0.04	-0.23	-0.10	-0.24	-0.01	-0.17	-0.10	-0.21	0.02	-0.14	-0.01	-0.15	-0.09	-0.14	-0.04	-0.12	-0.09	-0.13
1816	-0.11	0.08	-0.11	-0.02	-0.18	0.00	-0.05	0.05	-0.06	-0.05	-0.02	-0.03	-0.04	0.01	0.04	-0.05	0.03	-0.01
1817	0.05	-0.02	-0.04	0.00	-0.01	-0.05	0.01	0.04	0.07	0.16	-0.01	0.13	0.03	0.00	-0.11	0.08	-0.01	0.03
1818	0.00	0.20	-0.09	0.19	0.00	0.14	0.09	0.18	0.06	0.21	-0.04	0.18	0.10	0.12	-0.01	0.14	-0.07	0.17
1819	0.12	0.17	0.27	0.16	0.25	0.09	0.08	0.13	0.04	0.07	0.02	0.10	0.05	0.15	0.13	0.08	0.16	0.01
1820	0.00	-0.09	0.06	-0.06	-0.04	0.08	0.00	-0.14	-0.09	0.02	0.04	0.02	-0.13	0.07	-0.04	0.09	-0.03	0.07
1821	0.00	-0.12	-0.03	-0.14	-0.04	-0.13	0.04	-0.06	0.11	-0.30	0.14	-0.24	0.02	-0.15	0.03	-0.15	-0.01	-0.09

1822	-0.10	-0.01	-0.12	-0.06	-0.04	-0.06	0.00	-0.01	0.01	-0.10	-0.02	-0.04	0.08	-0.08	0.07	-0.07	0.10	-0.02
1823	0.04	-0.15	-0.04	-0.04	0.03	-0.13	-0.06	-0.27	-0.04	0.00	-0.03	-0.07	0.03	-0.04	-0.04	-0.05	-0.09	-0.04
1824	0.05	-0.08	0.10	-0.05	0.08	-0.03	-0.06	0.07	-0.04	-0.02	-0.08	-0.14	-0.04	-0.12	-0.13	-0.12	0.00	-0.07
1825	-0.13	-0.03	-0.02	-0.10	-0.11	-0.02	-0.17	0.11	-0.10	0.10	-0.14	0.05	-0.06	-0.06	0.09	-0.05	-0.07	-0.05
1826	0.04	0.32	-0.13	0.33	-0.14	0.37	0.12	0.26	0.03	0.32	-0.02	0.43	-0.02	0.34	0.01	0.26	0.13	0.16
1827	-0.14	0.02	-0.10	-0.06	-0.07	-0.11	0.05	-0.14	-0.02	-0.14	0.05	-0.13	-0.06	0.02	-0.12	0.04	-0.08	0.03
1828	0.03	-0.19	0.17	-0.20	0.13	-0.33	0.08	-0.28	0.08	-0.32	0.09	-0.22	0.01	-0.24	0.04	-0.17	0.00	-0.11
1829	0.13	-0.08	0.10	0.01	0.20	0.01	0.06	0.10	0.05	0.05	0.18	-0.03	0.16	-0.01	0.06	-0.06	-0.06	-0.06
1830	0.02	0.11	-0.06	0.11	-0.07	0.22	-0.09	0.14	-0.04	0.09	-0.12	0.03	-0.03	-0.01	0.02	0.02	0.04	-0.07
1831	0.14	0.34	0.11	0.23	0.03	0.21	0.05	0.21	0.07	0.25	0.05	0.27	0.05	0.16	-0.05	0.25	0.12	0.26
1832	-0.03	-0.14	-0.21	-0.08	-0.15	-0.10	-0.05	-0.11	0.02	-0.08	-0.06	-0.05	-0.04	0.10	0.09	0.01	-0.07	0.05
1833	-0.10	-0.22	-0.21	-0.08	-0.06	-0.07	-0.11	-0.10	-0.09	-0.11	-0.09	-0.10	-0.05	-0.06	0.00	-0.13	0.08	-0.07
1834	0.02	0.03	0.66	-0.05	0.36	-0.06	0.12	-0.07	0.04	-0.01	0.10	-0.02	0.10	-0.08	0.05	-0.03	0.06	-0.05
1835	-0.16	-0.09	-0.33	-0.07	-0.20	-0.08	-0.10	-0.11	-0.13	-0.07	-0.11	-0.04	-0.20	-0.05	-0.21	0.01	-0.23	-0.03
1836	-0.06	0.03	-0.17	-0.02	-0.16	-0.04	0.02	0.05	-0.05	-0.07	-0.15	-0.08	-0.15	-0.04	-0.09	-0.04	-0.14	-0.01
1837	0.13	0.12	0.01	0.07	0.10	0.13	0.06	0.06	0.10	0.07	0.17	0.03	0.11	0.03	0.16	-0.03	0.17	0.01
1838	0.04	0.05	0.16	0.07	0.04	0.02	0.00	0.08	0.13	0.12	0.17	0.13	-0.02	0.09	-0.03	0.09	0.01	0.09
1839	0.13	-0.08	0.14	-0.11	0.15	-0.08	0.09	0.02	0.06	-0.02	0.04	-0.03	0.43	-0.01	0.16	-0.05	0.12	-0.05
1840	-0.07	-0.14	-0.13	-0.05	-0.10	0.04	-0.06	-0.09	-0.09	-0.09	-0.07	-0.11	-0.05	-0.09	-0.05	-0.09	0.05	-0.15
1841	-0.14	0.15	-0.10	0.13	-0.11	0.09	-0.11	0.06	-0.11	0.13	-0.10	0.20	-0.24	0.12	-0.03	0.18	-0.15	0.09
1842	0.09	0.17	0.03	0.16	-0.03	0.16	-0.01	0.15	0.01	0.09	-0.04	0.02	-0.01	0.01	-0.04	0.02	-0.05	0.03
1843	-0.02	-0.02	0.03	-0.10	0.13	-0.05	0.14	-0.02	0.10	0.01	0.01	-0.01	0.06	0.00	0.03	-0.02	0.10	0.02
1844	0.02	-0.34	-0.05	-0.32	0.01	-0.38	0.10	-0.39	-0.02	-0.37	-0.06	-0.39	-0.01	-0.26	-0.02	-0.27	0.04	-0.03
1845	-0.13	0.07	-0.09	0.13	-0.13	0.05	-0.17	0.14	-0.10	0.17	-0.04	0.34	-0.05	0.19	-0.03	0.24	-0.13	0.01
1846	0.13	0.24	0.07	0.24	0.00	0.22	-0.11	0.18	0.04	0.13	0.13	0.07	-0.08	0.09	-0.04	0.05	-0.06	0.04
1847	0.16	0.10	0.25	0.05	0.27	0.15	0.13	0.08	0.14	0.10	0.05	0.03	0.15	0.03	0.18	0.08	0.11	0.10
1848	-0.14	-0.13	-0.12	-0.12	-0.11	-0.18	0.02	-0.15	-0.13	-0.21	-0.04	-0.17	-0.09	-0.07	-0.05	-0.14	0.09	-0.07
1849	0.03	-0.15	-0.14	-0.12	-0.08	-0.07	-0.01	-0.14	0.01	-0.11	0.06	-0.09	0.01	-0.09	-0.06	-0.12	-0.05	-0.09
1850	-0.12	-0.12	0.05	-0.09	-0.06	-0.08	-0.08	-0.02	-0.06	0.02	-0.08	0.02	-0.02	-0.03	-0.03	0.00	-0.01	-0.03
1851	-0.08	0.11	-0.15	0.08	-0.07	0.14	0.08	0.16	0.12	0.11	-0.03	0.03	0.08	0.00	-0.03	-0.02	-0.09	0.06

1852	0.07	-0.04	0.04	-0.10	-0.01	-0.10	0.05	-0.08	0.10	-0.01	0.11	-0.05	0.15	0.00	0.04	-0.03	0.08	-0.08
1853	0.19	0.14	0.26	0.11	0.20	0.10	-0.12	0.13	-0.11	0.03	-0.01	0.09	-0.08	0.04	0.12	0.08	0.03	0.02
1854	-0.10	-0.14	-0.01	-0.05	0.02	-0.14	-0.04	-0.16	-0.20	-0.13	-0.16	-0.10	-0.11	-0.05	-0.06	-0.05	-0.04	-0.06
1855	-0.01	0.18	-0.03	0.15	-0.05	0.17	-0.03	0.08	-0.04	0.15	-0.03	0.22	-0.10	0.03	0.00	0.19	-0.03	0.10
1856	-0.01	0.13	-0.10	0.15	-0.09	0.11	-0.02	0.15	0.17	0.15	0.00	0.15	-0.13	0.22	-0.08	0.11	-0.03	0.17
1857	0.02	-0.02	-0.01	-0.03	0.17	0.03	0.35	0.12	0.25	0.09	0.29	-0.02	0.34	0.06	0.10	-0.03	0.11	0.04
1858	0.05	-0.17	-0.05	-0.17	-0.04	-0.12	-0.02	-0.23	-0.11	-0.23	0.05	-0.22	0.08	-0.17	0.01	-0.18	0.07	-0.15
1859	-0.13	-0.19	0.15	-0.13	-0.02	-0.15	-0.06	-0.17	-0.03	-0.25	-0.03	-0.17	-0.05	-0.17	0.04	-0.16	-0.01	-0.06
1860	-0.08	0.02	-0.15	0.02	-0.11	-0.04	-0.19	0.00	-0.11	0.02	-0.21	-0.03	-0.13	-0.06	-0.11	-0.01	-0.10	-0.05
1861	0.05	0.15	0.14	0.15	-0.02	0.17	-0.03	0.28	-0.10	0.28	-0.04	0.25	-0.09	0.18	-0.05	0.17	-0.12	0.05
1862	0.29	0.17	0.09	0.05	0.11	0.06	0.09	-0.05	0.06	0.04	0.01	0.10	0.04	0.07	0.01	0.14	-0.06	0.04
1863	-0.17	-0.03	-0.12	0.00	-0.03	0.00	-0.06	0.01	0.07	0.07	0.01	0.01	0.03	0.08	-0.08	0.05	0.13	0.02
1864	0.01	-0.15	-0.08	-0.14	-0.01	-0.12	-0.03	-0.20	0.03	-0.24	0.06	-0.23	0.03	-0.15	0.07	-0.15	0.20	-0.06
1865	-0.04	-0.08	-0.16	-0.14	-0.08	-0.10	0.03	-0.07	-0.08	-0.19	0.05	-0.14	0.02	-0.15	0.18	-0.16	-0.13	-0.06
1866	-0.10	-0.16	0.24	-0.09	0.04	-0.15	0.02	0.05	-0.04	-0.02	-0.08	-0.06	0.03	-0.14	0.00	-0.20	-0.06	-0.10
1867	-0.03	0.28	-0.01	0.31	0.04	0.30	0.02	0.22	-0.04	0.37	-0.06	0.34	-0.02	0.28	-0.12	0.23	-0.05	0.25
1868	0.02	0.19	-0.02	0.17	-0.10	0.18	0.03	0.17	0.13	0.16	0.13	0.19	-0.01	0.18	0.02	0.23	0.14	0.10
1869	0.21	-0.11	0.05	-0.10	0.21	-0.11	0.15	-0.15	0.14	-0.16	0.11	-0.15	0.03	-0.03	0.01	0.01	0.05	-0.07
1870	0.07	-0.09	0.13	-0.12	0.03	-0.11	0.17	-0.12	-0.03	-0.15	-0.06	-0.14	0.05	-0.13	0.10	-0.06	-0.03	-0.08
1871	-0.04	-0.10	-0.03	-0.09	-0.02	-0.09	0.05	-0.10	-0.06	-0.08	-0.07	-0.02	-0.05	-0.05	-0.07	-0.13	-0.05	-0.04
1872	-0.14	-0.05	-0.18	0.00	-0.17	0.01	-0.40	0.04	-0.09	0.03	-0.08	-0.03	-0.10	-0.02	-0.11	-0.04	-0.10	-0.03
1873	-0.07	0.15	-0.08	0.09	-0.07	0.08	-0.37	0.08	-0.09	0.11	-0.05	0.09	-0.06	0.03	-0.09	0.06	-0.05	0.02
1874	-0.01	0.06	0.08	0.06	0.05	0.04	0.19	0.06	0.08	0.06	0.07	0.04	0.08	0.06	0.11	0.05	0.08	0.04
1875	0.09	-0.07	0.04	-0.06	0.06	-0.04	0.21	-0.05	0.04	-0.08	0.03	-0.04	0.03	-0.03	0.03	-0.03	0.03	0.00

Sources: Tabular commission, DDB Umeå University, 1750-1859; BiSOS 1860-1875. Own calculations, see text.
Note: Shaded cells mark years defined as famine (CDR and Rye price), i.e. when prices are more than 0.3 log units above normal (trend) and CDR increases more than 0.3 log units above normal within a two-year period.