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The European subsistence crisis of 1845 - 1850: A comparative perspective

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a comparative perspective**

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The European subsistence crisis of 1845-1850: a comparative perspective¹

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I. Introduction

The decade that gave rise to the term ‘the Hungry Forties’ in Europe is often regarded, and rightly so, as one of deprivation, unrest, and revolution. Two events – the Great Irish Famine and the various political events of ‘1848’ – stand out. Poor harvests and political unrest were widespread across the continent, however, and the connection between the two has been widely discussed. The subsistence crises of the second half of the 1840s may be divided into two rather distinct sorts. On the one hand, the failure of the potato caused by the new, unfamiliar fungus, *phytophthora infestans*, which first struck Europe in mid-1845, resulted in a catastrophe in Ireland that killed about one million people, and radically transformed its landscape and the economy. Ireland’s disaster puts the impact on the potato harvest elsewhere in the shade, but poor potato crops in 1845 and after resulted in significant excess mortality in other parts of Europe also. On the other hand, this period, and 1846 in particular, was also one of poor wheat and rye harvests throughout much of Europe. Failure of the grain harvest alone rarely resulted in a subsistence crisis, but the combination of poor potato and grain harvests in a single place was a lethal one.

Outside Ireland the 1840s are primarily associated with ‘1848’, the ‘Year of Revolutions’. When Karl Marx and Friedrich Engels forged their *Communist Manifesto* in London at the end of 1847 (the *Manifesto* was first printed in German shortly before the February Revolution a few months later), they made no mention of harvest crises. Later, though, Marx would interpret the crisis as a delayed reaction to the failure of the potato and the high price of cotton. The crisis that began in England, where it was delayed for a year or more by repeal of the Corn Laws, and ‘gradually... affected the whole world, from the giants of the City of London down to the smallest German shopkeeper...finally broke out in September 1847’. There followed several hectic months of revolutionary ferment when (in the words of English historian G.M. Trevelyan) ‘history failed to turn’ (see also Boyer, 1998).

¹ An earlier version of this chapter was presented at the International Economic History Association conference in Helsinki in August 2006. We are grateful to Peter Solar for his extensive comments both on that occasion and in subsequent correspondence.

Helge Berger and Mark Spoerer have argued recently, much in the spirit of Marx, that '1848' was the product of 'economic misery and the fear thereof', claiming that in most of Europe's shortfalls in agricultural output led to 'a decline in manufacturing activity after a certain lag'. Ironically, however, in their findings one of the few countries where agricultural distress did not impact much on the rest of the economy is industrial Britain. Their case for British exceptionalism finds support in C.N. Ward-Perkins' classic 'The Commercial Crisis of 1847', which claims that in Britain in 1847 the downturn in production applied only to cotton, and that this was due to an exogenous factor - the shortage of raw cotton in the U.S. South. On the other hand, macroeconomists Rudiger Dornbusch and Jacob Frenkel blame the British banking crisis of 1847 on the 'massive real shock' of a harvest failure that gave rise to 'commercial distress and financial panic'. The Bank of England dealt with this crisis by suspending the Bank Charter Act of 1844, which prohibited the Bank from issuing banknotes without full gold backing (Berger and Spoerer, 2001; Ward-Perkins, 1950; Dornbusch and Frenkel, 1984).

Connections between the local and the global, between the economic and the political, and between the rural and the industrial, make the crisis of the late 1840s a multi-layered one. Indeed, contemporaries frequently discussed the causes and effects of the Irish Famine in a broader, European perspective, mostly from very ideological presumptions concerning, for example, the pros and cons of a peasant-based society. Whether the Irish story was an example of or an exception to the European 'model' is a question always lurking in the background. Recently several contributions have sought to put the Irish Famine in a broader perspective (Mokyr, 1989; Gray, 1997; Solar, 1989, 1997; Ó Gráda, 1999: 226-227), but much more work needs to be done in this respect.

This book is the first to offer a truly comparative perspective on the causes and the effects of what is sometimes considered as the 'last' European subsistence crisis. This introductory chapter summarises and attempts to distil some of the most important findings of the book's dozen case studies. It begins with a review of economic and demographic trends in the century or so preceding the 1840s (Part II) and c. 1850 (Part III). This is followed by an account of the role of the potato and its impact on the subsistence crisis in different regions (Part IV), and of economic trends during the 1840s (Part V). Part VI summarises the demographic impact of the crisis. There follow sections on social unrest (Part VII) and the range of relief policies pursued (Part VIII). The impact (if any) on commercial policy is discussed in Part IX, while Part X points to some long-run effects of the crisis. Part XI stresses the importance of the regional dimension to the crisis within individual countries, and discusses the crisis as a set of regional crises. Finally, Part XII notes that both 'traditional' and 'modern' elements characterized the crisis of the 1840s.

[Figure 1.1 below, Europe in the 1840s, indicates the countries and regions mentioned in the book]



II. Economic growth, social polarisation and food availability: Western Europe before 1845

After a century of stagnation, population began to grow almost everywhere in Western Europe around the middle of the eighteenth century. The origins of this population growth are still not completely clear. A fall in the age of marriage and a general rise in fertility because of higher living standards, an attenuation or even disappearance of predatory epidemics, and a general fall in mortality because of a qualitatively improved diet, all seem to have contributed to this development to a greater or less extent. Compared with earlier centuries, at first glance Western Europe seems a very different place in economic terms at the start of the nineteenth century. Growth, not stagnation, was the keyword. A significant rise in industrial production especially in England (though less revolutionary than formerly believed) but also to a lesser extent elsewhere in Western Europe, and widespread agrarian improvements accompanied population growth. At the end of the eighteenth century growth of population even accelerated. Nonetheless, recent estimates of GDP suggest that the second quarter of the nineteenth century still saw sound economic growth per capita in most Western European countries (Table 1.1). Growth was considerably less in Northern Europe (Sweden and

Norway) and Southern Europe (Spain and Portugal). However, even in these more peripheral countries of Europe per capita rose slightly between 1820 and 1850. In heavily agrarian Ireland, for which GDP estimates are lacking, evaluating living standards before the 1840s is problematic. Different proxies offer different signals. Real wages seem to have risen somewhat between 1820 and 1835, after which date they fell again, though they were still above their pre-1820 level on the eve of the crisis. Other indicators imply a gloomier picture (Mokyr and Ó Gráda, 1988; Geary and Stark, 2004).

Country	1820/1850
Belgium	+1.1%
Denmark	+1.2%
Sweden	+0.2%
France	+1.1%
Germany	+0.9%
Netherlands	+0.9%
Spain	+0.2%
United Kingdom	

Source: Calculated from: Maddison, 2003: 58-59, 66-67; Tortella, 2000: 4. United Kingdom includes Ireland.

Rising urbanisation resulted in a higher general production per capita because people were moving from low productivity agriculture to high productivity industry and services. The rising share of labour input of industry and services made fast growth of these sectors possible, a growth which was stimulated even further by all kinds of technological improvements. Despite all these positive developments, however, Western Europe in the first half of the nineteenth century still had not completely freed itself from old Malthusian restrictions. Food intake per capita, in particular, remained a problem. Although national production figures were rising nearly everywhere at an unprecedented rate, caloric intake for large parts of the population lagged behind or even fell for shorter periods. Especially in the second quarter of the century anthropometric measures imply deterioration in the 'biological' standard of living (Komlos, 1998). The food intake of large parts of the Western Europeans had diminished enough to reduce the mean height of adolescents between 1830 and 1860. These are clear signs that Western European agriculture in the decades before 1860, despite economic growth in other sectors, was proving incapable of producing enough to improve significantly the diet of a majority of its inhabitants. Agricultural production between 1750 and 1850 rose (Glennie, 1999: 26-27), but no more than, and possibly even less than, population growth.

In this respect, the contemporary ideas of Marx and Engels about the *Verelendung* (impoverished condition) of the working class around 1850 have some empirical basis. But they miss the point that labourers' consumption of non-food goods and services was rising. Before 1800, food availability in the countryside had been quite good in normal years, but non-food products were scarce and expensive. There were two ways of getting hold of them: (1) producing them at home in an unspecialised way; (2) producing a

considerable agricultural (or proto-industrial) surplus to secure - after the deduction of taxes and land rents - the money to buy such products. After 1800 many opted increasing for the latter. Trends over these decades thus highlight the 'index number problem' presented by anthropometric measures of the standard of living: other, more comprehensive measures as real wages (taking into account non-food products too) show more favourable outcomes.

In the century before the potato blight, despite the different socio-economic settings, nearly all rural parts of Europe experienced severe social polarisation. Between 1750 and 1850 a growing part of the rural population was no longer able to fall back on even a small family holding. The result was increasing dependence on (a combination of) uncertain forms of wage labour. In this respect we see for example a rising share of small peasants and cottagers in Ireland, of near-landless peasants dependent on proto-industrial activities in parts of Flanders, and of a specialized farm labour force in Dutch and Danish commercial agriculture (Klep, 1981; Vanhaute, 1992; Paping, 1995; Henriksen, Ch. 14).

In all regions the combination of the rise of a relatively large and well-to-do class of commercial farmers with the expansion of the group of part time rural labourers and cottagers experiencing poor and deteriorating food conditions may be noted. In Sweden, for example, the share of landless and semi-landless rural dwellers rose from one fifth to about one half of the population between 1750 and 1870 (Gadd, Ch. 15). These social consequences of population growth resulted in the mid-19th century in about one-fourth to one-third of the European rural population (the share differing from region to region) being extremely vulnerable to large price increases.

Agricultural production did rise due to land reclamations and minor technical and organisational improvements, but it was hardly enough to escape from the law of diminishing marginal returns to labour. Agricultural labour productivity was stagnant or possibly even slowly deteriorating as a result of a falling land-labour ratio. Although rural population grew fast, urban population grew even faster in the period 1750-1850 (De Vries, 1984). Urbanisation was inevitably accompanied by a diminishing share of agriculture in labour input and this contributed to stagnant or even falling food availability per capita in the first half of the nineteenth century. Rising prosperity of parts of the urban population also resulted in a large demand for livestock products, the consumption of which was distributed very unevenly over the population. Increased production of livestock decreased the land available for the production of agricultural products with a higher calorific yield per hectare (cereals and potatoes). As a result large imports of cereals remained crucial for meeting Western Europe's food requirements, especially for the richer and more urbanised parts, such as in the Netherlands and increasingly England and Belgium.

It can be concluded that food availability remained a weak point in Western European economic prosperity and growth around 1840. Growth in real income of most groups in society in the previous years resulted mainly in a rising consumption of industrial goods and services, due to their high price and income elasticities. Technological change meant that the supply of these products was rising quickly and their prices falling relative to food. On the other hand the demand for food for large parts of the population was not completely price inelastic, so relative price increases resulted in a falling demand, insofar as the income elasticity of food products was very low.

Securing a larger money surplus to buy more non-food products meant for a lot of rural people selling more agricultural products to the market, reducing their self-provisioning (Komlos, 1998). This became an increasingly attractive strategy considering the relative rise of agricultural prices, and the relative fall in price of industrial products after 1830, especially on the European continent. Because of an enormous improvement in the terms of trade of the agricultural countryside, limited (or even zero) rises in productivity were accompanied by large increases in real income, but also by a fall in food consumption (Paping, 1995; Komlos, 1998). In this way relative price trends delivered more food from the countryside to the growing numbers of city dwellers. However, the price rises meant that the lower classes in the cities were unable - or unprepared - to buy much more food, even more so when the amount of bread one could buy for one's daily wage did not rise or even fell. Economizing on food on the other hand brought new cheap products within reach.

In general, the potato's track record as a staple food prior to 1845 was good and Europe had been spared major subsistence crises since the late 1810s. However, European economic progress before the 1840s was insufficient to prevent the unprecedented ecological shock of the potato blight from 1845 onwards and the failure of the harvest of the most important cereals, rye and wheat, in 1846 from causing severe problems for large parts of the population. In particular, the continuing failure of the potato harvests formed an enormous shock, because the widespread appearance of potatoes in the fields was one of the main positive agricultural developments in the period 1750-1850. The tuber showed very high yields per hectare compared to other crops, even taking into account that the calorific intake per kilo was far less than cereals. Potatoes had some further advantages. First, because they were rich in vitamin C, they enriched the diet. Second, they could be grown easily on tiny pieces of relatively infertile land, with no need for horse power, making them very suitable as garden vegetable for those with little or no land, who formed a rising part of the rural population. In this way it could replace cereals in the diet to a considerable extent. Even in cities the potato found its way to numerous gardens.

In the previous pages a general picture has been painted of the economic developments in Western Europe in the century before 1850. However, in reality large differences existed in economic development and structure between countries and also within countries. These differences help explain why the impact of the potato blight and the failure of the harvest of 1846 differed so much within Western Europe. In this volume most of the articles will focus on the consequences of the potato blight in a certain country. In the rest of this introductory article we will try to draw some comparisons between the different countries and to explain the differences.

III. The economic structure of Western Europe around 1850

After having sketched a general picture of economic developments in Western Europe in the first half of the 19th century, we now focus on national and regional differences around the middle of the century. As Table 1.2 shows the Dutch were according to the most recent estimates still producing the highest GDP per capita, an

inheritance of their extremely wealthy 17th and 18th century past. The difference with the more industrialised United Kingdom, however, was only small. If one takes into account that the figures for the United Kingdom include populous though backward Ireland, the level on the main British island will even have been around 2,700-2,800 Geary-Khamis 1990 dollars per capita, considerably more than the Netherlands. Belgium as the second European country experiencing industrialisation and Denmark with its relatively modern capitalistic agriculture were next in line. The economies of France and Germany lagged behind. GDP per capita around 1850 was lowest in peripheral Spain and Sweden, which experienced as already noted only very modest economic growth in the previous decades. Assuming that Irish GDP per head was 40-50% of the British average implies that it was roughly on a par with that of Sweden and higher than that of Spain.

Important features of the high levels of economic development in Great Britain and the Netherlands were a relatively high urbanisation rate and a low share of agriculture. Belgium followed at a clear distance. Differences between the other countries were small with a share of agriculture still fluctuating between 49% and 54% in 1870, while urbanisation ran in 1850 from 6% in Scandinavia to a comparatively high 17% for Spain. It may be concluded that except for the Netherlands and the British mainland the major part of the Western European population was rural, living on farms, in villages or in small cities. About half of the population was dependent directly on agriculture for its living. Clearly, however, a considerable part of the rural population was active outside agriculture, pointing at the fact that even outside large cities specialisation was becoming of importance. Rural activities outside agriculture ranged from artisans and salesmen working for the local markets to families working in proto-industry supplementing their income with small agricultural activities mainly directed at self-provision. Differences between regions within countries however could be large.

Table 1.2 Some key data for Western European economies around 1850

	Population in 1850	GDP per capita in 1850	employment in agriculture in 1870	Urbanisation cities of 10.000
Belgium	4,449	1,847	43%	21%
Denmark	1,499	1,767	52%	6%
Sweden	3,483	1,289	54%	(Scandinavia)
France	36,350	1,597	49%	15%
Germany	33,746	1,428	49%	11%
Netherlands	3,098	2,371	37%	30%
Spain	14,894	1,079	67%	17%
United Kingdom excluding Ireland	20,303	2,330	23%	40%
Ireland (1851)	6,552			10%

Source: Maddison, 2003: 34-35, 42, 58-59, 66; Maddison, 1991: 248; de Vries, 1984: 45; Tortella, 2000: 68. GDP per capita is in 1990 international Geary-Khamis dollars.

Concerning food supply, Bass (Ch. 9) makes a very useful division between four kinds of regions within Prussia:

1. Long-distance export regions (large farms and many labourers/cottagers);
2. Short-distance export regions (middle-sized farms);
3. Self-supplying regions (peasants, proto-industrialisation);
4. Food import regions (urbanised).

Taking into account that large internal differences existed, we can extend this division to the other European Countries. Ireland – apart from the northeast and parts of the remote west -- was typically a long-distance export region, which supplied England with cereals and meat. [France and Spain seemed to have been dominated by short-distance export regions producing for the few cities. Belgium, at least Flanders, was a combination of self-sufficient regions with heavy proto-industrialisation and some urbanised food importing regions. For the Netherlands food imports were of more importance (especially in the coastal area), although large parts can be considered as short-distance export regions. However, the very modern, market-oriented and specialised economy of the coastal Netherlands combined food exports (livestock, oats, cole-seed) with food imports (bread cereals and barley). Denmark can be best characterised as a long-distance export region, while in Sweden self-supplying regions seem to have been in the majority. However, it has to be stressed, that there were large differences in social-economic structure within all countries.

IV. The significance of the potato and the impact of the crisis

Unfortunately, nineteenth century national figures are scarce, and if available they are not completely comparable. This makes it difficult to compare the consequences of the potato blight and the accompanying failure of the rye harvest for different Western European countries. However, in several chapters in this book some clues are given to make a rough comparison viable. Table 1.3 implies that the role of the potato differed enormously between countries. Within-country differences were also large as the contributions on France (Vivier), South Germany (Mahlerwein), and the Netherlands (Paping and Tassenaar) in this volume show.

Table 1.3 Potato production and consumption and the fall in yields in 1845 and 1846 compared to ‘normal’ years

	Pre blight % arable ground Potatoes	Pre-blight daily potato consumption per capita (kilo)	1845 decline in potato yields	1846 decline in potato yields	1846 decline in rye / wheat yields
Belgium	14%	0.5/0.6	-87%	-43%	-50% / -10%
Denmark	3%	0.2/0.3	App. -50%		App. -20%
Sweden	5%	0.5/0.6	App. -20/25%		App. -10%
France	App. 6%	0.5	-20%	-19%	-20% / -25%
Württemberg	3%-8%	n.a.	-55%	-51%	-15% / -24%
Prussia	11%	1.0/1.1	n.a.	-47%	-43%
Netherlands	11%	0.7	-71%	-56%	-47% / -6%
Spain	2%	low	n.a.	n.a.	n.a.
Highlands of Scotland	n.a.	high	n.a.	App. -80%	n.a.
Ireland	App. 32%	2.1	App. -30%	App. -88%	App. -33% (oats)

Source: Figures mainly estimated from the different chapters in this book, with special thanks to Hans-Heinrich Bass, Carl-Johan Gadd and Peter Solar; Tortella, 2000: 60 (Spain 1857); Von Reden (1853/54: 87-95); Hellstenius (1871: 106); Gadd (1983: 248); *Emigrationsutredningen* (1913: 91); *Statistisch en staathuishoudkundig Jaarboekje (1850: 232)*; Ó Gráda (1999: 24). See also: Bourke (1993: 53).

Clearly the position of potatoes in Irish diet had no parallel in Western Europe. Irish population growth in the century before 1845 depended heavily on the increasing availability of potatoes. Nearly comparable amounts of potatoes were eaten in the Scottish Highlands, with Prussia (according to Bass's estimates) as the next largest consumer following at great distance. In food-importing Netherlands and in Belgian Flanders the potato played a somewhat larger role in agriculture and diet relative to most of the rest of continental Europe, although the differences were rather small. On average, potatoes delivered between 10 and 30 percent of the necessary daily calories. However, averages do not tell the complete story. For families in specific conditions and regions,

the proportionate share of potatoes in the diet could have been a lot higher. Vanhaute (Ch. 7), for instance, suggests that small peasants and rural labourers consumed 1 to 1.5 kilos potatoes daily on average. Ó Gráda (Ch. 2: table 2.1) shows that Irish labourers comprising two-fifths of the population also consumed about one and a half as much potatoes than the average Irishman.

The potato blight appeared in the United States in 1843, possibly having come from Mexico or South America. In Europe it was first noticed in June 1845 near Courtrai in Belgium (Bourke, 1993: 140-144) from where it spread in the next weeks through the Netherlands, parts of northern France and the neighbouring English coast. In the month after the middle of August the disease also appeared in western Germany, southern Denmark, the rest of England and eastern Ireland. Only after the middle of September the whole of Ireland, and parts of Scotland, eastern Germany, south Norway and south Sweden were touched.

Because of its rather small share in the average diet, the failure of the potato harvest in 1845, though causing hardship, could quite easily be overcome in most of continental Western Europe. In France the potato blight only appeared in certain areas. The potato harvests in the Netherlands and Belgium were hit hardest in 1845. In Denmark the consumption of potatoes was very low and in Sweden, as Gadd (Ch. 15) clearly shows, the problems were restricted to parts of the country, while the north for climatic reasons remained untouched by the potato blight. In Ireland (where the blight showed up only in September and October) and in France (the south remained untouched in 1845) the loss of potatoes in 1845 was -- about 30% and 20%, respectively -- significant, but still not dramatic.

The harvest of 1846 was a different story. In Ireland and the Scottish Highlands the potato yields were barely enough or insufficient to provide for the next year's seed. On the other hand, in 1846 potato yields improved in Belgium and The Netherlands. However, in these countries and also in Prussia about half the potato harvest was lost. In much of northwestern Europe the problems caused by the potato were exacerbated by the loss in 1846 of almost half of the rye harvest, while the wheat harvest was considerably below normal. This was disastrous, with bread from rye or wheat being even more important than potatoes in continental European diets. It bears emphasis that the failure of the Dutch, Belgium and Prussian rye harvest of 40-50% in 1846 was extreme by nineteenth century standards. For example, in the Netherlands in the period 1852-1913 the rye harvest was never more than 34% below normal, and in France in the period 1815-1835 it never fell by more than 13% below average (see Solar, 1989: 116).

Although in the years after 1846 the potato blight still depressed yields in specific years (e.g. 1848), this didn't result in grave problems outside Ireland inasmuch as the production of food alternatives remained nearly untouched those years. In fact, judging by the very low levels of cereal prices, supplies of wheat and rye may have been particularly abundant in these years.

V. Economy and population during the blight

Tables 1.1 and 1.4 present Angus Maddison's most recent estimates of the development of GDP per capita in most of the countries surveyed in this volume. Because of the difficulties in reconstructing national accounts, the annual fluctuations in the estimates of GDP per capita only give a rough idea of what is happening in national economies. For the 1840s annual data are available only for five countries in Western Europe, and these do not seem very much in line with each other. Excluding the Netherlands in all the other countries enormous yearly fluctuations seem to have taken place, which, however, can only partly be linked to the potato blight in 1845-1846 and the disastrous rye harvest in 1846. In the first half of the 1840s a process of catching-up seem to have been taking place. The very wealthy Netherlands and United Kingdom experienced a slow deterioration of the economy, while more backward countries like France, Denmark and Sweden showed quite healthy growth figures.

In the specific years of the potato blight GDP figures developed rather opposite. In the United Kingdom where agriculture played only a relatively minor role in economy, the national product even increased very fast in 1845 and 1846. In the Netherlands which were in quite the same situation no important fall in the overall economic figures can be traced. In the other three countries agriculture played a far more important role in economy. In France and especially in Sweden there were clear signs of a depression in 1845 and 1846. Denmark on the other hand remained remarkably untouched, possibly because of its specialisation in livestock farming.

Table 1.4 Annual growth of GDP per capita in Western Europe (percentages)

	1840/44	1845	1846	1847	1848	1849	1850/60
Belgium	n.a.	n.a.	n.a.	+4.0%	-0.5%	+2.1%	+2.3%
Denmark	+1.8%	+1.6%	+1.2%	-1.4%	+4.2%	+4.9%	+0.3%
Sweden	+1.3%	-6.6%	-3.0%	+5.6%	+4.9%	+2.2%	+1.0%
France	+2.8%	-3.5%	-0.1%	+10.6%	-6.5%	+2.8%	+1.7%
Germany	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	+1.7%
Netherlands	-0.4%	+0.1%	-0.3%	+0.4%	+1.1%	+2.3%	+0.2%
Spain	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	+1.4%
United Kingdom	-0.9%	+4.3%	+5.7%	+1.3%	+2.7%	+2.7%	+1.8%

United Kingdom is including Ireland. Source: Maddison, 2003: 58-59, 66-67.

Countries such as France and Sweden, which were affected mainly by the 1845-1846 crisis, returned to normal or near-normal in the following year 1847. Trends in Belgium, for which GDP figures are available from 1846 onwards, seem in line with these two. On the other hand, in 1847 growth in the Netherlands and the United

Kingdom² was quite low, while the economy of Denmark even experienced a setback after growth in the previous three years.

This is not the place to consider short-run economic developments in the following years; however, some remarks can be made. From 1848 onwards, although annual economic fluctuations differed enormously between countries, in the long-run developments were quite in line, with the Netherlands and to a lesser extent Denmark growing considerably more slowly than the other countries in the period 1848-1860. Interesting is also the fall in production in France during the year of revolution (1848).

Table 1.5. Estimated annual population growth rates in some Western European countries (percentages)

	1840/45	1845/6	1846/7	1847/8	1848/9	1849/50	1850/60
Belgium	+1.1%	+0.9%	+0.9%	+0.0%	+0.5%	+0.2%	+0.7%
Denmark	+1.1%	+1.0%	+0.8%	+1.0%	+1.0%	+1.0%	+1.2%
Sweden	+1.1%	+0.8%	+0.6%	+1.0%	+1.3%	+1.2%	+1.0%
France	+0.5%	+0.7%	+0.4%	+0.1%	+0.3%	+0.0%	+0.5%
Germany (total)	+1.0%	+1.0%	+0.5%	+0.2%	+0.1%	+0.9%	+0.7%
Prussia	+1.3%	+1.4%	+0.8%	+0.5%	+0.4%	+0.9%	+1.0%
Netherlands	+1.1%	+1.1%	+0.3%	-0.2%	+0.1%	+0.3%	+0.7%
United Kingdom*	+1.2%	+1.2%	+0.7%	+0.7%	+0.7%	+0.7%	+1.3%
Ireland	+0.4%	-0.2%	-4%	-4%	-4%	-4%	-1.7%

Note *: United Kingdom is excluding Ireland, and the result of interpolation between 5-year estimates. The figures for Ireland are only very rough estimates, and must not be taken literally. Source: Denmark, Sweden and United Kingdom: Maddison (2003: 34-35, 42-43), mid-year numbers have been compared. France: 'Recensement' (1966); Prussia: www.learn-line.nrw.de/angebote/eda/medio/preussen; the Netherlands: Smits et al (2000: 109-110); Belgium: *Population* (1843-1851); *Documents* (1857-1869). For these countries 1845/46 relates to the development from 1 January 1845 to 1 January 1846. For Spain and Ireland annual figures are lacking.

Clearly, a genuine subsistence crisis has to show up in demographic data. During the first half of the 1840s there were very few differences in population growth between the different countries (Table 1.5). Only Ireland stands out, showing some signs of adjustment to the enormous economic and demographic problems that it faced in this period. The deceleration in Irish population growth before 1845 was mainly the result of a reduction in nuptiality and heavy emigration (Ó Gráda, 1999: 25-26). The rest of Western Europe experienced a considerable annual growth of around 1% already since the second half of the 19th century.

² However, as noted above, the British financial crisis of 1846-1847 is hardly reflected in the macro figures, suggesting that this crisis did not have much impact on output in most sectors and for the employment of Irish moving to England. However, the figures for industrial growth alone were far worse in 1848: France - 11%, Prussia -24%, and the Netherlands -4% (Berger and Spoerer, 2001: 313).

The demographic effects in other countries were dwarfed by what happened in Ireland. Maddison's figures imply, probably correctly, that Irish population fell marginally between mid-1845 and mid-1846. Over the following four years famine Ireland lost about one-fifth of its population, especially because of starvation and emigration, but also because of falling birth rates. It seems logical that during the actual potato blight mortality was the prime mover in this process of depopulation, while at the end of the 1840s emigration to North America and England was of most importance, death and birth figures returning to more normal values. Emigration continued to reduce the Irish population in the 1850s. In the Scottish Highlands, having a somewhat comparable potato-dependent structure as Ireland, a similar process of depopulation was taking place. However, Devine (Ch. 6) argues that because the Highlands were less overpopulated thanks to heavy emigration before 1845, and because it was easier for Highlanders to escape starvation by moving to the industrialised Lowlands, adjustment was less dramatic in the late 1840s.

Population trends in the rest of Western Europe during the Irish disaster are of interest. Two groups of countries show up in the figures. A first group comprises of Great Britain, Sweden, and Denmark who all experienced only very minor setbacks in population growth. The consequences in Sweden are clearest, while in Denmark they were negligible. In the United Kingdom population growth slowed down in the period 1847-1850, however the figures are the result of interpolation between 5-year periods so they are not really suitable for a year-to-year analysis.

The figures for Germany, the Netherlands, France and Belgium, however, suggest that the potato blight had relatively more distinct general demographic effects on the Western European mainland. A closer look makes clear that in 1846 and 1847 the Netherlands were hit more than Germany, France and Belgium, which had to do with a malaria epidemic raging the Dutch coastal provinces. In 1847 population growth in all four countries was nearly zero. In Prussia population growth was a little bit higher, suggesting a fall in population in other parts of Germany. However, in 1848-1849, after the worst of the blight was over, population growth remained remarkably low in these Western European countries. Paping and Tassenaar (Ch. 8) attribute this continuing stagnation in the Netherlands to cholera and possibly to an influenza epidemic.

VI. Deaths, births, and migration

The Irish Famine killed about 1 million people, or one-eighth of the total population. This makes it one of the major human disasters in the last centuries, even on a world scale. Mortality started to rise steeply only in the autumn of 1846, after the second harvest failure. In 1847, the mortality rate was more than three times higher than its pre-Famine norm (first half of the 1840s). The famine struck hardest in the west and southwest. Most of the victims were the rural poor. Even in the Irish case, local 'triggers' seem to have been important, such as the spread of infectious fevers, the health situation in over-populated workhouses and the labour conditions (certainly in the winter months) in public works. As in other famine-affected regions few people died directly of

starvation. Most of them succumbed to hunger-related diseases such as typhoid fever, typhus and dysentery (Mokyr and Ó Gráda 2002).

Relative to Ireland, the death toll of the famine years 1845-1847 in the rest of Europe was small, a few hundred thousands at most. But figures are not easy to compare and interpret. What are famine-related deaths? We should exclude excess mortality in 1849, an infamous cholera year. What are normal ratios? In practice our comparison refers to average rates in the first half of the 1840s.

In Scotland, 'people did survive' as Devine (Ch. 6) notes. Surplus mortality was limited in time, from late 1846 to early 1847. Contrary to Ireland, excess mortality was highest in the cities. In Belgium mortality figures in 1847 were 30% higher than in the preceding years. Total excess mortality in 1846-1848 may have been as much as 40,000-50,000 deaths. Mortality was highest in the linenregions in East- and West-Flanders with excess death rates rising from two-fifths to double or more in certain locations. Most died from typhus and other hunger-related diseases. Dutch excess mortality was comparable to that in Belgium, an increase of 32% in 1847, with regional peaks of up to 50-60%. The highest numbers were not recorded in inland sandy regions such as Flanders, but in the coastal clay provinces and in the densely urbanised province of North-Holland. In Prussia mortality rose in 1847 by two-fifths relative to earlier years, resulting in an excess mortality of about 42,000 people. Surplus mortality was highest in long-distance exporting regions with a large-scale commercial agriculture such as East Elbia, followed by proto-industrial regions such as Upper Silesia.

In the rest of Europe, crisis-related mortality seems to have been very light. In South Germany and Switzerland only some regions such as the canton of Bern were confronted with surplus mortality. The same seems to be true for France. On average, in France mortality in 1847 was only 4-5% higher than in the years 1841-45, resulting in some 10,000s crisis-related excess deaths. However, regional differences were marked. Chevet and Ó Gráda (Ch. 12) claim that these differences were related to 'local epidemics, and not, at least directly, to the problems of subsistence'. In Denmark and Sweden mortality in 1847 was about one-tenth higher than normal. Mortality in Copenhagen rose by up to one-fifth due to typhus and other epidemics seemingly unrelated to famine.

Little is known about the gender and age differentiated impact of the 1840s famine. Sparse figures from Ireland and other regions suggest that slightly more men than women became victims of the famine. The Flemish and Dutch case studies indicate that surplus mortality was highest in the groups of adults and elderly people (40-69 years old). In case surplus mortality was not related to privation and famine related diseases, young children seem to have been much more the prime victims, for example, during the cholera epidemic of 1849. (compare Dyson and Ó Gráda, 2002).

It must be stressed that most people faced by famine conditions did not die, but they did suffer. An indication is the slowing down of the body growth of adolescents in crisis years. In Flanders the group of undersized recruits of 18-21 years old increased from less than 20% to more than 25% after 1847. A similar decrease in heights took place in the Netherlands, where the group of small recruits under 1.57 m increased by 20% in the years after 1847. Here the rise was strongest in the cities, as against Flanders in the villages in the linen districts.

The demographic impact of sudden economic shocks such as famines becomes not only visible in a sudden rise in mortality, but also in a decline in fertility and natality. Typically, the decline in births started about a year after the local outbreak of the blight. In Ireland births fell back by a third, resulting in about 0.5 million averted conceptions. Declines were lower but still remarkable in Flanders (one-fifth to one-third in 1847), the Netherlands (one-tenth to one-fifth), and Prussia (one-eighth). In France the decline was only one-sixteenth, but that nevertheless represented the sharpest decline in the period 1810-1870. Compared to the preceding years, nuptiality in 1847 declined by 30-40% in Flanders and by 11% in France. In Denmark and Sweden the impact of the crisis on natality and nuptiality was negligible.

As in the case of excess mortality, Ireland in the 1840s and 1850s was the classic case of a famine-driven wave of mass-emigration. In 1855 one quarter of native Irish men and women lived abroad. Most moved to North America, but the famine also greatly increased the number of Irish-born in Great Britain (Neal 1997). As in Ireland, Scottish collective memory of the famine is closely related to transatlantic mass migration. Mainly as a result of mass clearances and manifold schemes of assisted passage across the Atlantic, some Scottish regions lost, between 1841 and 1861, one-third to one-half of their population. Moreover, movements of temporary migrants from the Highlands to the Lowlands and to England helped to relieve the impact of the famine. The situation on the continent was strikingly different. Even in the worst affected regions such as inland Flanders or East Elbia, the crisis generated no movements of mass migration, neither to the cities nor overseas. As a result, most rural dwellers stayed in the region of origin. Rural Flanders, much affected by a subsistence and industrial crisis, lost only 9% of its population between 1846 and 1850.

The information provided in the contributions in the book suggest that the demographic effects of the subsistence crisis of the 1840s were most pronounced on a west-east axis from Ireland over the British Islands, the Northern and Southern Netherlands and further to East Prussia. The further north and south of this line, the weaker the demographic impact of the crisis. Comparative analysis of the demographic effects of the subsistence crisis of the 1840s confirms the necessity of a regional approach. A fortiori the same is true for national correlations, for example between demographic and price data. It is not surprising that most contributors in this book stress that explanations for these regional differences must be sought within the organisation of the regional and local economy and society, and not in national comparisons.

As a crisis indicator, mortality is a very incomplete benchmark. More direct indicators of human crisis behaviour are nuptiality, natality and migration. The case studies in the book show clearly that in the most affected regions (British Isles, Belgium, The Netherlands, Prussia, but also in France), the shock of the blight was followed by a strong decline in conceptions (births) and (presumably) marriages. This implies that regions such as Denmark and Sweden which produced no meaningful reaction in fertility behaviour witnessed no crisis shock comparable with the other regions mentioned. The effects on migration behaviour correlates not with that of nuptiality and fertility. Only the devastated 'British' regions of Ireland and Scotland were the scenes of a dramatic wave of mass migration. On the continent, the crisis was often harsh, but not in the sense that it wiped away completely the basics of rural survival relations.

VII. Social unrest

In a recent publication Berger and Spoerer (2001) explored the correlation between grain price shocks in the years 1845-1847 and political turmoil in 1848 for 21 European regional economies. They concluded that if a country was subjected to a grain price shock between 1845 and 1847, then it was more likely to experience a political revolution in 1848. They found only a few exceptions, such as Denmark (a revolution without price shocks). Berger and Spoerer's research brought back to the fore the argument that political unrest and revolutions were very closely linked with short-term economic disturbances. This argument was particularly popular in French historiography about the revolutions of 1848, as both Vivier (Ch. 11) and Chevet and Ó Gráda (Ch. 12) have underlined in their contributions. At the same time these authors warn against blowing up the crisis-factor as a main explanation for the revolutionary waves. Social unrest as a political protest of poor against rich only appeared in the aftermath of the crisis, as Vivier notes (e.g., the forest riots in 1848). Moreover, as Solar's contribution (Chapter 4) implies, grain markets in Europe were quite well integrated during the crisis, and tended to move in broad tandem. As for the Danish case, Henriksen (Ch. 14) concludes that the political revolution of 1848 was triggered by matters other than food prices.

The other cases presented in the book confirm the opinion that social unrest resulting from the famine crisis was not related to national protest movements, but rooted in local and regional social relations. This is most clear in case of 'classic' market riots. A real wave of market disturbances surged over Europe in 1846-1847, with a peak in the spring of 1847, when grain prices peaked. It is striking that regions with market-oriented agriculture and a substantial number of wage labourers were by far most affected by market disturbances. In France riots were heaviest in cities and in grain exporting regions. This resulted in different forms of protest, from blockades and forced sales to local riots arising from rumours of speculation. According to Diaz Marin (Ch. 13) the pattern in Spain is very similar: a huge wave of short time market riots, mostly lasting one or two days, in the first half of 1847, all instigated by a rise in grain and bread prices and by suspected instances of speculation and export. Unrest was most intense in regions such as Andalucia with a significant number of workers relying mainly on wage income and where access to relief was very limited. In Prussia, riots were almost exclusively restricted to the long-distance grain exporting regions. Although price rises were as high, market disturbances were much less common in more self-supplying counties. As Bass (Ch. 9) suggests, a combination of three sets of causes is necessary to trigger collective social unrest in a period of high bread prices: a) an assumed threat of food deprivation and of uncertainty on the food markets by a large group of market-dependent families, b) strong group formation and 'horizontal' communication (on market supply and prices) in the lower (labouring) classes and c) the reaction of the authorities ('vertical' information). In other regions, such as South Germany, Flanders and The Netherlands, riots were almost exclusively urban events, mostly directed against the symbols of (perceived) speculation, such as millers, bakers and traders.

Some contributors to this volume stress the double nature of the massive wave of local riots: first, the older, more traditional reactions against higher food prices, against alleged injustices in the working of the markets; second, more modern reactions against new contingencies resulting from proletarianisation, job uncertainty, wage instability, and a growing dependency on insecure forms of wage labour.

The case studies in the book suggest that market riots triggered by actual or expected shortages and price rises were almost exclusively restricted to regions with commercial, grain-exporting agriculture and to cities. In peasant-based economies with a lower dependency on purchased grain and bread consumption, collective actions were scarce, even in the darkest days of the crisis. Social unrest in peasant economies was mostly limited to small, often individual actions of resistance and law-breaking. Even in famine-devastated Ireland, food riots were limited to the first period of the crisis (Eiríksson, 1997). Rising unrest was reflected in higher numbers of registered criminality (such as theft, cattle- and sheep rustling, burglaries and robberies). In Flanders small food riots were confined to the cities. On the other hand, petty criminality (notably mendicancy and vagrancy, petty theft, pillage, stealing crops) rose by 50% in the crisis years 1846-1847. In these crisis-related actions, women and children were overrepresented, as Vanhaute (Ch. 7) showed. The same pattern can be seen in Sweden, where crimes against property as theft and pilfering rose most in the crisis years. As expected, the correlation with (grain) prices was weak, in contrast with crop failure in general, as Gadd (Ch. 15) convincingly argues.

VIII. Local social policy

Both the impact of famine and the range of social unrest were mostly absorbed within the structures of local society, at least on the continent. Village structures had two major components, the village institutions and the actions of the local elites, whether or not through the local institutions.

In most crisis-affected areas there was a strong increase in municipal activities at different levels: (a) local relief policy (through structural institutional relief and food aid), (b) market regulation by protective rules, price subsidies, the purchase of grain, potatoes and other food products, export prohibitions, and so on, (c) employment actions either in charity workshops and workhouses or by projects of public work, and (d) repression such as prohibitions against begging and vagrancy.

Flanders is a typical case where local communities carried the heaviest burden in organising and financing relief, control and repression activities. In the crisis years about two-fifths of the people in the most affected areas received some form of communal aid. In the Netherlands in 1847 18% of the people were supported by local relief boards, against 13% in 1840-1844. In some regions the numbers supported doubled. In France expenditures of the local relief boards doubled between 1843 and 1847, often financed by an extra 'poor tax'. The same pattern is seen in South Germany.

Such timely village actions are less clear in regions with large-scale export agriculture, as in East Elbia. In Prussia local poor institutions were strongest in the west and weakest in the most affected regions in the east. In Spain local authorities only

intervened after the riots of spring 1847 with a combination of aid actions and employment programmes such as public works and coercive employment of the poor by farmer-proprietors. In Scandinavian countries pressure on local communities remained limited. Nonetheless on average one-fifth of the population was temporarily dependent on poor relief.

The situation in the British Isles was very different. As Gray (Ch. 4) shows, there was considerable interest in the London epicentre in the ‘continental response’ to the crisis, but that interest mainly fed an ingrained scepticism. Supported by the axiom of Irish and Highland economic backwardness, the main focus was not on amelioration, but on the need for a radical transformation of rural society. That is why London elites ‘tended to pathologize Irish difference from British social, economic and cultural norms’ (Ch. 4). As a consequence British policy in Ireland was rooted in the idea that the local structures were the cause and not the solution of the problem. The 1847 reform of the poor relief system drastically reduced relief entitlements of rural smallholders when the Famine was still raging. The workhouse system, initiated in 1838, was not designed to cope with a major famine crisis. As Daly (Ch. 3) states, ‘famine relief policies were designed, not simply to bring about short-term assistance, but to transform Irish rural society’.

A major explanation for the resilience of local communities is the interests and actions of local elites. Such elites played a decisive role through their control of local policy, relief and police institutions, through their financing (via poor rates and other forms of taxation) of extra expenditure, and through their organising of private relief and protection actions. The role of private initiative is very clear in the case of Denmark, where the relief actions in 1845-1847 were organised by local merchants and exclusively funded by private charity. This exceptional situation was a result of the mild nature of the late 1840s crisis in Denmark. During the harsher crisis of 1853-1856 local institutions were much more active.

In Ireland local elites could not fill in the gap that the weakness of local village structures left. The often absentee Anglo-Irish landlords were mostly preoccupied by their own survival, often resulting in campaigns of mass eviction and weak support for local relief structures. As Devine (Ch. 6) remarks, this is in contrast with the Scottish case, also part of the United Kingdom. In Scotland, the landlord response was much more proactive and aimed at support and help (food aid, job creation, rent remissions). Evictions were one of the responses, as in Ireland. But here, they involved more assisted emigration to North America and Australia (but see Norton, 2005). Devine regards the stronger financial position of the Scottish landlords, due in large part to their concentration on sheep-farming, as the main explanation (compare Éiríksson and Ó Gráda, 2006).

In his contribution Vanhaute (Ch. 7) argues that one of the main differences in the effects of the crisis in Flanders and Ireland is that in Flanders local institutions and the strategies of local elites absorbed much of the tension provoked by the subsistence crisis. It seems that this reasoning can be extended to all regions where peasant agriculture was still strong. Conversely, regional economies based on export agriculture and with elites with only small interests in the local village communities tended to have only small-to-minimal shock absorbing mechanisms. As a result the lower classes were much more vulnerable to simple price shocks.

IX. National trade policy

The debate about the relationship between famine and government has always been a very emotional and even ideological one. As Gray (Ch. 5) and Daly (Ch. 3) point out both the contemporary debate about and the subsequent assessment of the impact of the mid 19th century famine have been very much biased by the 'Irish example'. Those stressing the disastrous English 'colonial' policy in Ireland claim that the rejection of 'food entitlements' is by far the main cause of the mass starvation. The firm belief in the need to breakdown Irish peasant society and the ideological adherence to the principal of free trade prevented a coherent interventionist policy. Others claim that the absolute level of food shortage ('food availability') was so immense, that no contemporary government could ever have prevented the destructive impact of the Irish famine. But even in the last case, the British authorities could and did make choices, and those were all dictated by the ideologically-based conviction that centralisation of the Irish relief institutions and an open border policy was the best option to achieve the intertwined goals of ending the famine, restructuring the Irish society and making the Irish people pay for what was regarded as 'their' crisis.

The British did not act in an international vacuum. On the contrary, as Gray makes clear, they were very much interested in how continental authorities coped with the crisis. In each country active policy measures were accompanied by sometimes vivid debates about the merits of free trade versus protection. But all in all, in contrast to Britain, actions taken by the continental governments were mostly dictated by very practical motivations. The Dutch government was, after the British, probably the one most dedicated to the ideology of open borders and undisturbed market mechanisms. Although the Dutch government did take actions to stimulate imports and to discourage exports, both imports and exports increased in the crisis years, highlighting the role of the Netherlands as a centre of international trade. The same 'intermediary' attitude is seen in internal policy, as famine relief was considered to be primarily a matter for private initiative. Also firmly attached to free trade ideology was Denmark. Although as early as September 1845 some anti-crisis measures were taken, such as the installation of a 'potato commission', the Danish government did not ban food exports or raise export duties. They even started in 1846 with the phasing out of their own Corn Laws, bringing into practice in the middle of the crisis the rules of free trade. Spanish trade policy was also directed towards stimulating exports. Proposals to limit exports of grain and potatoes in 1847 generated animated discussions but ultimately did not pass parliament. Only some regional regulations protected internal consumption, but this was according Diaz Marin (Ch. 13) too little and too late. Liberal orthodoxy was only occasionally deviated from when public order was at stake (e.g. with the repressive Vagrancy Law).

Belgian policy was characterized by a much more interventionist stance. From as early as September 1845 exports of food products were prohibited and imports were stimulated. As a result of an active purchase policy, bread grain imports doubled, then trebled in 1845-1847. Direct subsidies were voted to support the flax industry and to finance public works. This prompt reaction was consistent with the country's protectionist policy since the founding of the Belgian state in 1830. This is most clear in

the protection of the 'old' proto-industrial flax industry (trade conventions, subsidies etc.). This example of pragmatic, short run 'crisis management' was not accompanied by a more fundamental, long-term interventionist policy (emigration, internal colonization, and structural support of industrial activities). On the contrary, after 1850 Belgium became one of the best pupils in the classroom of free trade.

In France too, the 'liberal state' of the 1840s intervened in adjusting customs tariffs, in reducing transport costs, and in purchasing large quantities of Russian wheat. Compared to the pre-crisis norm, imports (in nominal terms) rose by tenfold in 1846 and 1847. Prussia is also regarded as a non-interventionist liberal state, at least insofar as exports are concerned. In order to protect producers east of the Elbe, until the mid 1850s high tariffs on grain imports were the rule. Nonetheless, the Prussian government took several anti-crisis initiatives between December 1846 and September 1847, including the financing of public works and the massive purchase of rye. Even tariffs on grain exports were raised temporarily in spring 1847, but only in May 1847 in the East, after most of the harvest was already exported. As Mahlerwein (Ch. 10) shows, the authorities in southern Germany followed 'old patterns', such as the prohibition of distillation and 'attempts' at market regulation.

Although in relative terms the crisis in Sweden was very moderate, the national government issued a ban on the export of potatoes in 1846 and on all sorts of grains, bread and potatoes in August 1847. Concerning internal relief, the authorities also brought into application traditional methods based on temporary trade regulations in support of regions with bad harvests (so-called 'relief grain'). Moreover the national government invested substantial amounts of money in subsidies and loans for public works and for interest-free loans for local and regional authorities. This regionally diversified support could be very substantial. As Gadd (Ch. 15) points out, this interventionist policy is motivated by the fact that the Swedish government was until then extremely dependent on incomes from rural areas, and thus on the fiscal and political significance of peasant farmers.

Strategies and actions taken by national governments differed considerably in the crisis-affected zone. Variables that can explain these differences are the structure of the regional economy (commercial versus peasant), the impact of the subsistence crisis (strong versus mild), and the ideological orientation (strong versus weak free-traders). There is however one constant in the analyses in this volume, the doubt about the impact and effectiveness of the measures taken by the national authorities. In what way were national governments of the mid 19th century able to master economic shocks such as the harvest crisis of 1845-1847? It seems clear that everywhere locally based institutions were best positioned to cope with the also locally very diversified effects of the subsistence crisis. Everywhere, except in Ireland, where such institutions were effectively lacking.

X. Long term effects

As Gray points out in his contribution, the key premise underlying the contemporary British debate on the origins and effects of the Irish famine, was the

desirability of and/or the need for a 'social revolution' within Irish society. Arguments pro and con often pointed at the vices and virtues of the 'continental model' based on peasant farming. According to the ideological presumptions of the debater, the so-called 'European peasantry model' was the cause of or, on the contrary, the safety net for the agricultural crisis. Comparisons with the continent (and especially with France and Flanders) were popular because the Irish tragedy was so difficult to analyse and understand. Was it due to the peasant structure of the society or, on the contrary, to the fact that the British had broken down the pillars under the former rural society? Was the famine an 'eternal' slur on Irish history, or did it, eventually, transform and modernize society? Supporters of the first view stress the surprising slow demographic recovery of the island and the permanent emigration flow until well in the 20th century. Others argue that living standards did rise after the famine and life for survivors was better before than after the famine.

The picture of the long-term effects of the crisis of the 1840s on the continent is not unambiguous either. The contributions on Flanders and the Netherlands draw a rather gloomy picture. In Flanders, the crisis of the 1840s broke down the resilience of the mixed family farm. The disappearance of old proto-industrial activities further reduced the household income position. Lace-making, small industrial activities, and commuting (e.g. to mines in Wallonia and Northern France) provided alternative survival chances for the majority of the Flemish rural population. In the Netherlands, the subsistence crisis of the 1840s marked the start of a long-term deterioration of living standards as reflected in mean height as an indicator of physical well-being (aggravated by the high food prices during the Crimean war 1853-1856). Only after 1860s did things begin to ameliorate.

Regions and countries dependent on or shifting to agricultural exports seem to have profited from the aftermath of the subsistence crisis. This is most clear in Denmark. Henriksen (Ch. 14) speaks of 'favourable effects', not only for the commercial farmer, but also for the peasantry. 'Wheat was an important element in the Danish gain from the grain crisis'. Similar effects are noted for Sweden and Spain. In Sweden, grain exports grew after 1847 (with a push during the years of the Crimean War). Spain shows the same accelerating process, where according to Diaz Marin (Ch. 13) 'the crisis was inscribed in a process of expansion of agrarian capitalism'. This process, however, increased in the short run social inequality and reduced living standards.

XI. A regional crisis

Famines are regional crises (e.g. Mokyr, 1985; Lachiver, 1991: 144-53; Maharatna, 1996: 179-95). One might go further and claim that famines are regional crises which only can be understood by the 'local story'. Thus the marked differences between the east and west of Ireland, between the Scottish Highlands and Lowlands, between Inner-Flanders and South Belgium, between clay and sandy regions in the Netherlands, and between East and West Prussia show that national averages are often meaningless. Although this book brings together ten 'national' cases, the bottom line in the different stories is that the causes and effects of the subsistence crisis of the 1840s cannot be evaluated on a national scale. Regional differences are a key feature. Only in

Ireland did the famine grow into a national disaster, and its incidence varied considerably by region. In the rest of Europe, the crisis was examined and handled as a regional event. As Bass (Ch. 9) puts it clearly: 'There was not a single subsistence crisis, but instead a bundle of economic and demographic crises in the late 1840s, only partly tied together by causal chains'.

This means that famines such as the potato famines of the 1840s have to be analysed on different spatial levels: international (the dispersion of the blight, international trade etc.), national (national policy), regional (regional agro-systems) and local (local communities, local elites, households). However, the regional level seems to be the central scale. All contributions in this book show how differences in the regional economic and social organisation determine the impact of the harvest failures. By summarizing the arguments for the regional differences, we bring together the basic elements for a comparative interpretation scheme.

Devine (Ch. 6) gives four explanations why mortality in Highland Scotland was much lower than in Ireland: a) in Scotland, the 'population at risk' was much smaller, and as a result the famine struck only some well defined regions; b) Scottish peasant society was more diversified and less dependent on one crop; c) Scottish peasants had more income alternatives because temporary migration was possible to the industrialising regions in the lowlands (temporary migration); d) relief systems in Scotland were more diverse, with a central role for landlords and for private networks as organised by the Free Church of Scotland. Local communities such as parishes remained important in Scotland. Therefore, as Devine concludes, aid in Scotland was 'immediate, generous and vigorous'. Vanhaute (Ch. 7) draws an extensive comparison between Flanders and Ireland. Like Devine, he stresses some similarities (peasant agriculture, demographic growth, structural tensions between population and income, peripheral position towards the political centre). The main reasons why Flanders did not starve were: a more differentiated peasant economy, stronger village structures (resulting in more effective poor relief), the strong position of local elites and the church, and a prompt and protective state reaction.

In his contribution on Prussia Bass (Ch. 9) argues that vulnerability was much more marked in commercial agricultural regions with high numbers of wage labourers. In this setting, aggregate food availability is not the central explanatory factor; much more important are distribution and food entitlements, as reflected in purchasing power and market access, price setting and the relief regime. Typically, wage labour means greater vulnerability. Paping and Tassenaar (Ch. 8) make the same point for the Netherlands. The regions at risk were not the inland peasant villages, but the market-oriented regions near the big rivers and the sea. The correlation between food shortage, high prices and hunger is also stressed in the contribution of Mahlerwein (Ch. 10) on southern Germany.

In an analysis based in part on a comparison with earlier French subsistence crises, Chevet and Ó Gráda (Ch. 12) label the French crisis of 1846-1847 'not a genuine subsistence crisis'. This is not to deny the presence of a 'crisis' associated with the political revolution of 1848 and the severe social turmoil associated with it. Vivier (Ch. 11) refines the Labrousse thesis, labelling the 1840s as a 'transitional crisis', a combination of a 'traditional' subsistence crisis and a 'modern' capitalistic crisis. She describes the period as a 'mixed crisis', a crisis with many dimensions: a regional harvest and supply crisis, an industrial and credit crisis and a social and political crisis. The case

of Spain is partly comparable with France, because of the political and constitutional turmoil of the late 1840s. As an example of a 'crisis without potatoes', Diaz Marin (Ch. 13) stresses the impact of high grain and bread prices (reaching a peak in spring 1847). Declining real wages caused distress, starvation and higher infant mortality among the social group of wage labourers.

Henriksen (Ch. 14) evaluates the crisis in Denmark as mild. Main reasons are the gains, also for the peasantry, from growing export of wheat, the small role of the potato in consumption and production, the absence of cottage industries. Gadd in his essay on Sweden (Ch. 15) concurs in this evaluation by stating that the years 1845-1850 'can hardly be considered a crisis period'. The country as a whole escaped, because Sweden became in this period a net grain exporter, the potato blight had a limited impact on production and consumption, the grain crisis was regionally limited. Hardship in these countries was limited to people dependent on wage labour and/or benefits.

XII. A traditional and a modern crisis?

The main focus of this book is on the agricultural sector, and on the contrasting impacts of a series of harvest failures in different parts of Europe. Some regions and countries escaped largely unscathed; in others, the harvest failures led to serious famines.

In his famous account of the conditions producing 'gigantic inevitable famine', Thomas Malthus differentiated Europe from the rest of the world; indeed, he erred on the side of complacency when he conceded that 'perhaps in some of [Europe] an absolute famine may never have been known' (1992: 42). Yet by the time the crisis described in this book struck in the mid-1840s, the impact of famine on Europe had already been diminishing for several centuries. Northern Italy, for example, had been virtually free of famines since the seventeenth century; England's last had been in the then remote northwest in the 1620s; and in France after *le grand hiver* of 1708-09 famine-related mortality was modest relative to the disasters of the previous century. Even in Ireland it is claimed that there was a 'gap in famines' between the great famines of the 1740s and 1840s (Dickson, 1989).

Of course, this is not to deny outbreaks of famine or near-famine in the half-century or so before the crisis of the 1840s. France (and surrounding regions) had suffered excess mortality in 1794-1795 in the wake of a poor harvest and a bitterly cold winter; Ireland suffered a whole series of mini-famines before the cataclysm that struck it in 1846; the severe hardship facing the poor in England in 1790s prompted both Edmund Burke's *Thoughts and Details on Scarcity* (1795) and T.R. Malthus's *Essay on the High Cost of Provisions* (1800); and war-torn Finland endured significant famine-related excess mortality in 1808-09. Yet even the well-known famine of 1816-1817, famously dubbed 'the last great subsistence crisis in the western world' by John D. Post (1977), pales into insignificance when compared to the slaughter wrought by famine in 1690s in France, Scotland, or Finland. In the 1830s and 1840s it would have been reasonable to assume that Western Europe at least had escaped from the clutches of what Malthus called 'gigantic, inevitable famine'.

It seems plausible to link this apparent reduction in the risk of famine in Western Europe to gradual improvements in agricultural productivity and to better communications. The previous two centuries had seen the introduction of new crops, better rotations, and better livestock. There were signs of improved road networks and the development of inland waterways leading to increasing regional specialization. It must be said, however, that there is no consensus among scholars regarding trends in productivity and living standards in Europe in the pre-industrial era. Most recent assessments suggest very modest productivity growth in agriculture before 1800 and downward pressure on real wages. The anthropometric evidence from military archives and skeletal remains, albeit spotty, tends to corroborate (Steckel, 2001). Angus Maddison, it is true, reckons that real GDP per head in Western Europe rose by almost three-fifths between 1500 and 1820, but that increase is deemed far too high by Jan Luiten van Zanden and Giovanni Federico (Maddison, 2001: Table B-21; van Zanden, 2001; Federico, 2002).

Although the declining frequency and gravity of famines suggests that life was gradually becoming less precarious in Europe, estimates of average nutritional intake in France and England c. 1800 imply – on plausible assumptions about the distribution of calories across the whole population – that even in those relatively developed economies the bottom tenth or so were still endemically malnourished. The situation a century earlier was even worse: Robert Fogel, author of these exercises in energy accounting, reckons that average calorie consumption per male adult equivalent c. 1800 (2,933 kcals) was over two hundred kcals more than a century previously. It seems reasonable to link the decline in crisis mortality in England since Tudor times to improved calorific intake. However, Ireland's higher average daily intake (of about 3,150 kcals) on the eve of the Great Famine did not shield it against the catastrophe (Fogel, 1992; Ó Gráda, 1994: 85-86).

In parts of Europe the gradual attenuation of subsistence crises and associated 'moral economy' protests made it easier for central and local governments to pursue the economic policies of the Enlightenment and liberalize the trade in foodstuffs (Persson, 1999). The liberalization tended to apply to internal rather than foreign trade, however. In France all restrictions on the internal grain trade were finally removed with the Revolution. Significantly, during the crisis of 1816-1817 most governments throughout northwestern Europe -- though not the British -- maintained free trade in corn.

The crisis, or crises, described in this book can be put down to four proximate or immediate factors:

[1] In most of the case studies the most important factor was the failure of the 1846 wheat and rye harvests. Those failures stretched from Andalusia to Prussia, and grain prices everywhere were affected, as Solar shows (Ch. 4). The price increases led to panic, popular unrest, and privation.

[2] However, grain harvest failures alone did not lead to excess mortality (except to a minor extent in Spain). Most of the excess mortality in this period was due to the failure of the potato crop, either alone or in combination with the failure of grain crops. The mysterious blight responsible, *phytophthora infestans*, reached Belgium first, where it inflicted most damage in 1845. The timing and size of its impact on crops varied across countries. In 1845 Belgium (Flanders) was worst hit. In 1846

the blight wiped out most of the potato harvests in Belgium and in Ireland, but its ravages in France were no worse in 1846 than in 1845. In 1847 *phytophthora* was less evident, but in Ireland the crop failures of 1845-1846 had reduced the area under potatoes in 1847, so that the harvest was again only a fraction of its pre-famine norm (see again Table 1.3 above).

[3] Wherever the potato bulked large in the people's diet, its failure resulted in severe hardship and in excess mortality (Ireland, Flanders, the Scottish Highlands, the Netherlands, Prussia). In some of these areas (the west of Ireland, Flanders, the Scottish Highlands) the potato was accompanied by extreme fragmentation of holdings, although the degree of dependence on the potato reached in Ireland was matched nowhere else. In such places, the potato was associated with population pressure, with output pressing at the margins, and the very unbalanced agrarian regime that it underpinned had more or less reached its limits by the 1840s. However, in the Netherlands, East Prussia and much of eastern and southern Ireland the potato was associated with large farms and export-oriented capitalist agriculture. The connection between agrarian structure and vulnerability to famine is thus not straightforward, although in all cases the entitlements status of the poor was paramount.

[4] The crisis in agriculture coincided with the rapid diffusion of mechanization in the spinning of flax. In the north of Ireland the numbers of (mainly female) spinners plummeted in the 1840s for much the same reasons they collapsed in western Flanders. In Ireland, the famine was not the main cause of the collapse, although it may have exacerbated it in some areas. By contrast with Flanders, in Ireland the famine was most intense where dependence on the linen industry was lowest.

These years also saw a financial crisis that spanned the continent, and which in England resulted in the suspension of the recently legislated Banking Act. Some blamed the crisis on the bursting of a bubble in railway shares (though not a halt to railway construction) but, as noted above, the link with poor grain and potato harvests is more plausible. In Britain the Bank Act of 1844 placed an unnecessary straitjacket on the money supply, with the result that one of its main provisions had to be suspended in late 1847. In some countries, this crisis resulted in bankruptcies and factory closures.

When the costs of this crisis in total lives lost are reckoned, Ireland clearly counted for the major part. Excess mortality in Spain was modest, and evidence of excess mortality in France is elusive. In Scandinavia, too, there was no excess mortality. However, famine-related deaths in Germany and the Low Countries in 1846-1848 totalled perhaps one-fifth of the Irish toll of about one million. The unfolding famine in Ireland was responsible for both the repeal of the controversial Corn Laws and the ensuing demise of Sir Robert Peel's Tory administration. For Great Britain the crisis of 1846-1847 was more of an 'externality' in another sense: immigration from Ireland was responsible for far more deaths than the failure of English harvests per se (Neal, 1998). Similarly, the modest excess mortality in Scotland in 1847 occurred mainly in the towns and cities, and was mainly the product of immigration from the Highlands, where the potato failure resulted in severe privation but little if any excess mortality (Ch. 6).

The crisis exhibited some common features across most of the countries examined here. Rioting and petty theft rose sharply almost everywhere. And judging by the evidence of Flanders and in Ireland, as described in Chapters 1 and 6, the character of crime changed too. The pattern follows that described by Pitirim Sorokin (1975 [1922]: 236) and Ancel Keys *et al.* (1950: 785) over half a century ago. According to these scholars, food riots – as distinct from individual acts of thieving and cheating – are more likely to be the product of ‘minor hunger and deprivation’ rather than ‘real starvation’. When the latter strikes, ‘[t]hough moral and social standards may be lost, lethargy and weakness are powerful deterrents against strong action.’ In Sorokin’s version, ‘we must expect the strongest reactions from the starving masses at the time when hunger is great but not excessive’. It is surely telling that in Ireland, which suffered more than anywhere else in the 1840s, the ‘revolution’ of 1848 was confined to the one-day siege of a farmhouse in Tipperary (compare Eiríksson, 1997).

In Ireland the apocalyptic character and the demographic dimensions of the crisis recalled famines of earlier era. Nothing comparable had happened in Ireland itself since 1740-1741, and in relative terms the Irish famine surpassed the disasters of the 1690s and 1700s in France and of the 1690s in Scotland. At the same time, the crisis was a ‘modern’ one in that it took place in a context of considerable market integration and food movements across national borders. In Ireland the crisis prompted the opening up of the country to foreign grain, and prompted mass long-distance migration on an unprecedented scale. Indeed, without such migration the crisis would have been even worse (Ó Gráda and O’Rourke, 1997). Such was the degree of market integration that the relative gravity of the crisis in different countries cannot be inferred by price increases. As Solar shows in Ch. 4, prices across Europe rose and fell more or less in tandem. Such would hardly have been the case in earlier centuries.

Bibliography

- Berger, H. and Spoerer, M. (2001) 'Economic Crisis and the European Revolutions of 1848', *Journal of Economic History*, 61, pp. 293-326.
- Bourke, A. (1993) *'The visitation of God'? The potato and the great Irish famine*, Dublin.
- Boyer, G.R. (1998) 'The historical background of the Communist Manifesto', *Journal of Economic Perspectives*, 12, pp. 151-174.
- De Vries, J. (1984) *European Urbanization 1500-1800*, London.
- Dickson, D. (1989) 'The gap in famines: a useful myth?', in E.M. Crawford (ed.) *Famine: the Irish Experience*, Edinburgh, pp. 96-111.
- Dornbusch, R. and Frenkel, J.A. (1984) 'The Gold Standard and the Bank of England in the Crisis of 1847', in M.D. Bordo and A. J. Schwartz (eds), *A Retrospective on the Classical Gold Standard, 1880-1913*, Chicago, pp. 233-264.
- Documents Statistiques, 1851-1869 (1857-1869)*, Bruxelles.
- Dyson, T. and Ó Gráda, C. (2002). *Famine Demography: Perspectives from Past and Present*, Oxford.
- Eiríksson, A. (1997). 'Food supply and food riots', in C. Ó Gráda (ed.), *Famine 150: Commemorative Lecture Series*, Dublin, pp. 67-93.
- Eiríksson, A. and Ó Gráda, C. (2006) 'Bankrupt landlords and the Irish famine', in C. Ó Gráda, *Ireland's Great Famine*, pp. 48-62.
- Emigrationsutredningen. Betänkande i utvandingsfrågan* (1913), Stockholm.
- Fogel, R.W. (1992) 'Second Thoughts on the European Escape from Hunger: Famines, Chronic Malnutrition, and Mortality Rates,' in S. R. Osmani (ed.). *Nutrition and Poverty*, Oxford, pp. 243-286.
- Gadd, C.-J. (1983) *Järn och potatis. Jordbruk, teknik och social omvandling i Skaraborgs län 1750-1860*, Goteborg.
- Geary, F. and Stark, T. (2004) 'Trends in real wages during the industrial revolution: a view from across the Irish Sea', *Economic History Review*, 57, pp. 362-395.
- Glennie, P. (1999) 'Introduction to part I', in B.J.P. van Bavel and E. Thoen (eds), *Land productivity and agro-systems in the North Sea area (Middle Ages – 20th century) Elements for comparison*, Turnhout, pp. 22-29.

- Gray, P. (1997) 'Famine relief in comparative perspective: Ireland, Scotland and North-West Europe, 1845-49, *Éire-Ireland*, 37, pp. 86-108.
- Hellstenius, J. (1871) 'Skördarna i Sverige och deras verkningar', *Statistik tidskrift*, 20, pp. 77-120.
- Keys, Ancel, J. B., A. Henschel, O. Mickelsen, and H.L. Taylor (1950) *The Biology of Human Starvation*, vol. I, Minneapolis.
- Klep, P.M.M. (1981) *Bevolking en arbeid in transformatie. Een onderzoek in Brabant 1700-1900*, Nijmegen.
- Komlos, J. (1998), 'Shrinking in a Growing Economy? The Mystery of Physical Stature during the Industrial Revolution', *Journal of Economic History*, 58, pp. 779-802.
- Lachiver, M. (1991) *Les années de misère: la famine au temps du Grand Roi*. Paris.
- Maddison, A. (1991) *Dynamic Forces in Capitalist Development*, Oxford and New York.
- Maddison, A. (2003) *The World Economy. Historical Statistics*, Paris.
- Maharatna, A. (1996) *The Demography of Famines*. Delhi.
- Malthus, T.R. (1992) *An Essay on the Principle of Population*, Cambridge.
- Mokyr, J. (1985) *Why Ireland Starved: A Quantitative and Analytical History of the Irish Economy 1800-1850*, London.
- Mokyr, J. (1989) 'Industrialisation and Poverty in Ireland and the Netherlands: Some Notes Toward a Comparative Study', *Journal of Interdisciplinary History*, 10, pp. 429-59.
- Mokyr, J. and Ó Gráda, C. (1988) 'Poor and getting poorer? Irish living standards before the Famine', *Economic History Review*, 41, pp. 209-35.
- Mokyr, J. and Ó Gráda, C. (2002) 'Famine disease and famine mortality: lessons from the Irish experience, 1845-50', in Dyson and Ó Gráda (2002), pp. 19-43.
- Neal, F. (1998) *Black '47: Britain and the Famine Irish*, London.
- Norton, D. (2005) 'On landlord-assisted emigration from some Irish estates in the 1840s', *Agricultural History Review* 53, pp. 24-40.
- Ó Gráda, C. (1994) *Ireland: A New Economic History 1780-1939*, Oxford.

Ó Gráda, C. (1999) *Black '47 and beyond. The Great Irish Famine in History, Economy, and Memory*, Princeton.

Ó Gráda, C. (2006). *Ireland's Great Famine: Interdisciplinary Perspectives*. Dublin.

Ó Gráda, C. and K.H. O'Rourke (1997). 'Mass migration as disaster relief: lessons from the Great Irish Famine'. *European Review of Economic History*, 1, pp. 3-26.

Paping, R.F.J. (1995) *Voor een handvol stuivers. Werken, verdienen en besteden: de levensstandaard van boeren, arbeiders en middenstanders in de Groninger kleigebieden, 1770-1860*, Groningen.

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

Population. Mouvement de l'état civil, 1841-1850 (1843-1851), Bruxelles.

Post, J.D. (1977) *The Last Great Subsistence Crisis in the Western World*, Baltimore.

'Recensement de la population, 1846, 1851' (1966) *Annuaire statistique de la France*.

Smits, J.-P., Horlings, E. and Van Zanden, J.L. (2000) *Dutch GNP and its components, 1800-1913*, Groningen.

Solar, P.M. (1989) 'The Great Famine was no ordinary subsistence crisis', in E.M. Crawford (ed.) *Famine: The Irish Experience, 900-1900*, Edinburgh, pp. 112-131.

Solar, P.M. (1997) 'The potato famine in Europe', in C. Ó Gráda (ed.), *Famine 150. Commemorative Lecture Series*, Dublin, pp. 113-128.

Sorokin, P.A. (1975) *Hunger as a Factor in Human Affairs*, Gainesville [The original Russian version was published in St. Petersburg in 1922].

Statistisch en staathuishoudkundig Jaarboekje, 2 (1850).

Steckel, R. (2001) 'Health and nutrition in the pre-industrial era: insights from a millennium of average heights in northern Europe', *NBER Working Paper No. 8542*.

Tortella, G. (2000) *The Development of Modern Spain. An Economic History of the Nineteenth and Twentieth Centuries*, Cambridge, Massachusetts and London.

Traugott, M. (1983) 'The mid-nineteenth-century crisis in France and England', *Theory and Society*, 12, pp. 455-468.

Vanhaute, E. (1992) *Heiboeren. Bevolking, arbeid en inkomen in de 19de-eeuwse Kempen*, Brussel.

Van Zanden, J.L. (2001) 'A survey of the European economy 1500-2000', in M.R. Prak (ed.), *Early Modern Capitalism: Economic and Social Change in Europe 1400-1800*, London, pp. 69-87.

Van Zanden, J.L. (1985) *De economische ontwikkeling van de Nederlandse landbouw in de negentiende eeuw 1800-1914*, Utrecht.

Von Reden, F.W. (1853/54) *Erwerbs- und Verkehrs-Statistik des Königstaats Preussen. In vergleichender Darstellung*, 3 Teile, Darmstadt, <http://www.digitalis.uni-koeln.de>.

Ward-Perkins, C.N. (1950) 'The Commercial Crisis of 1847', *Oxford Economics Papers*, 2, pp. 75-94.