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Famine and Market in Ancien Régime France

CORMAC Ó GRÁDA AND JEAN-MICHEL CHEVET

How—and how well—do food markets function in famine conditions? The controversy surrounding this question may benefit from historical perspective. Here we study two massive famines that struck France between 1693 and 1710, killing over two million people. In both cases the impact of harvest failure was exacerbated by wartime demands on the food supply; we ask whether the crises were exacerbated yet further by a failure of markets to function as they did in normal times. The evidence, we conclude, is most consistent with the view that markets in fact helped alleviate these crises, albeit modestly.

Aujourd'hui ces matières paraissent d'une telle aridité qu'elles provoquent le vide, même au sein du parlement, si par hasard on les y discute . . . On ne voit plus des écarts de prix comparables à ceux des grandes années de famine de la fin du règne de Louis XIV: 1693 et 1709.

Germain Martin (French historian) in 1908¹

In *The Wealth of Nations* Adam Smith made the classic case for free trade in foodstuffs during what he called “dearths,” or shortfalls in supply. All “dearths” in Europe over the previous two centuries or more, Smith asserted, had been due to poor harvests, sometimes exacerbated by warfare, and not to collusion between grain merchants. Smith also distinguished between “dearths” and “famines,” claiming that all European “famines” in the same period had been due to “the violence of government attempting, by improper means, to remedy the inconveniencies of a dearth.” He believed that grain merchants minimized such inconveniencies by ensuring both interregional and intertemporal arbitrage.² The optimal selling strategy for the merchant would be to even out consumption for consumers over the harvest year; merchants who held on to supplies for too long would be forced to sell at a

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¹ [Today these issues seem so stupefyingly dull that they produce an empty house, even in parliament, if by chance they are discussed there. . . . One no longer sees gaps in prices comparable to those of the years of famine at the end of the reign of Louis XIV, in 1693 and 1709.] Martin, “Famines,” p. 150.

² Smith, *Inquiry*, pp. 526–34.

loss. Besides, by reallocating grain from areas in relative surplus to those in relative deficit, the market mechanism was also likely to produce a net reduction in the damage done by harvest failure.

Smith's preoccupation here was with the influence of markets once a harvest shortfall occurs. That influence hinges on the degree of market integration in normal times; in backward, famine-prone economies facing high transport costs and (perhaps) cumbersome controls on interregional trade, the scope for trade in nonfamine years may be limited. This is a reminder of another way in which markets can reduce the probability and the gravity of famines: market integration, by ensuring that different regions pursue their comparative advantage, increases steady-state aggregate output and incomes, thereby reducing the vulnerability of the economy as a whole to any given harvest shortfall. Though this mechanism was emphasized in the work of Claude-Jacques Herbert and other French Enlightenment writers, Smith's concern—as in the historiography of markets and famines generally—was with the impact of famines on the normal functioning of markets.³

The claim that the market produces the optimal spatial and intertemporal allocations during famines would be echoed later by such economic luminaries as Thomas Malthus and Mountifort Longfield.⁴ However, the ability of merchants and markets to gauge the supply situation correctly in such circumstances has been questioned by other economists, then and since. Smith's first biographer and compatriot, Dugald Stewart, held that agents lacked the information necessary to measure the scope of a harvest failure early in the season. Both he and the agronomist Arthur Young believed that big day-to-day or week-to-week swings in grain prices were due to "apprehension," and therefore did not reflect market fundamentals.⁵ If producers miscalculated their prospects and held back supplies in the false hope of yet higher prices later, intertemporal misallocation would result in "bubbles" in the markets for staple foods. The smooth functioning of markets during famines also requires that deviations from the Law of One Price between different regions of an economy be short-lived. However, in practice local or regional markets may become balkanized because bad weather disrupts communications, or because the pressures of "moral

³ On enlightenment thinking see Persson, *Grain Markets*, pp. 1–22. Note too François Quesnay's remark in his article on corn in the *Encyclopédie*: "le prétexte de remédier aux famines dans un royaume, en interceptant le commerce des grains entre les provinces, donne encore lieu à des abus qui augmentent la misère, qui détruisent l'agriculture, et qui anéantissent les revenus du royaume" [Attempting to prevent famines in a kingdom by intercepting the movement of grain between provinces gives rise to abuses which accentuate suffering, destroy agriculture, and greatly diminish the revenues of the kingdom.] (*François Quesnay et la Physiocratie*, p. 494n).

⁴ Malthus, *Investigation*, pp. 12–14; and Longfield, *Lectures*, pp. 52–58.

⁵ Young, *Travels*, vol. 2, p. 401; and Rashid, "Policy," p. 497.

economy” or local politics intervene to prevent food shipments dictated by market forces.⁶

The verdict of empirical analyses of market response during famines is mixed. Amartya Sen’s researches into the Great Bengali Famine of 1942/43 has pointed the finger at farmers and grain merchants for turning a “moderate shortfall in *production* . . . into an exceptional shortfall in *market release*.” Martin Ravallion’s study of the 1974 Bangladeshi famine has also blamed market failure, concluding that excess mortality was, “in no small measure, the effect of a speculative crisis.” In Bangladesh rice prices rose dramatically because merchants badly underestimated a harvest that turned out to be normal. Prices then fell back just as fast. Ravallion also found evidence of “significant impediments” to trade between the capital city, Dhaka, and its main sources of supply during this famine. Joachim von Braun, Tesfaye Teklu, and Patrick Webb have similarly pointed to the weak spatial integration of markets in Sudan and Ethiopia as an exacerbating factor during the famines of the mid-1980s. In those instances price explosions and market disruptions were “commonplace.” Roadblocks restricted interprovincial movements of grain and people, and food supplies for the armed forces were extracted from farmers and traders at fixed prices. The result was sharply rising marketing costs, and price trends in subregions often became dependent on conditions in those same subregions alone.⁷

Historical studies of how markets work during famines are scarce. Ravallion’s study of India’s foreign trade in grain between the 1890s and World War I is also critical of the market mechanism, finding that trade was a slow and inadequate consumption stabilizer during famines.⁸ However, recent analyses of the spatial and intertemporal variations in food prices during two major nineteenth-century European famines, the Great Irish Famine of the 1840s and the Great Finnish Famine of 1867/68, rule out market segmentation or the hoarding of foodstuffs on any grand scale. In both these instances disastrous food shortfalls overwhelmed functioning markets.⁹

The present study concerns two famines in an economy where internal food markets are usually deemed to have been poorly integrated: *ancien régime* France. Most historians agree that in the century or so before the Revolution, high transport costs and local vested interests inhibited grain shipments between the different regions of France, particularly in times of actual or threatened famine. In 1693/94 France endured a famine that re-

⁶ Smith ignored the possibility that an embargo on exports from a famine-affected region could, through its impact on relative purchasing power, benefit those most at risk. Only if the necessary transfers from rich to poor took place would those at risk accept a free market.

⁷ Sen, *Poverty and Famines*, p. 76; Ravallion, *Markets and Famines*, pp. 19, 111–13, and “Famines and Economics,” pp. 1219–21; and von Braun et al., *Famines in Africa*, ch. 6.

⁸ Ravallion, “Trade and Specialization.” However, the output data underlying this study are dubious, and its focus should arguably have been on net rather than total exports in foodgrains.

⁹ Ó Gráda, *Black '47* and “Markets and Famines.”

sulted in a toll of well over one million deaths, or 6 percent of its population. Little more than a decade later, in 1709/10, another famine killed over half a million more. Such numbers make these major catastrophes by world-historical standards. Were these famines made worse by the poor integration of regional food markets? As shown below, the proportionate price rises in France during these crises were subject to wide regional variation; in Aix-en-Provence in 1693, for example, the price of wheat hardly rose, while it doubled or more in towns in several other regions.¹⁰ Does this mean that trading opportunities that might have saved lives were missed?

We shall first describe the demographic contours of the famines of 1693/94 and 1709/10, paying particular attention to their regional dimensions. We then survey the literature on grain markets in *ancien régime* France. Later sections discuss the link between supply and price, and the spread of prices. Finally we shall assess the integration of pairs of markets in normal and in famine times, and offer some conclusions.

THE GREAT FRENCH FAMINES OF 1693/94 AND 1709/10

Robert Fogel has argued that in early modern England mortality crises were “too scattered in time and in space to have been the principal factor in the secular decline in mortality after 1540.”¹¹ In France both normal and crisis mortality rates were higher than in England. Table 1 reports estimated crude death rates (CDR) for France and England c. 1670–1720, plus estimates of “crisis” mortality in the same period. Crisis mortality is defined as excess mortality over the trend in years when excess deaths are at least 10 percent above trend. By this reckoning, between 1680 and 1719 crisis mortality accounted for one French death in 16, as opposed to about one English death in 35. The major famines of 1693/94 and 1709/10 are mainly responsible for the difference. Note that France also suffered at least two other major famines in the seventeenth century, the crisis associated with the revolt of the Frondeurs in 1650–1652 and the “accession crisis” of 1660–1662.¹² These earlier famines have not been much studied, though (as explained in Appendix 1) in aggregate they killed more people than the later pair.

The famines of 1693/94 and 1709/10 were both the results of bad weather and poor harvests; they were almost certainly exacerbated by wars waged on France’s borders and further afield. The first famine was her-

¹⁰ See too Martin, “Famines,” p. 168.

¹¹ Fogel, “Second Thoughts,” p. 247.

¹² Goubert, *Avènement*, pp. 281–96; and Cabourdin et al., “Crises démographiques,” pp. 203–06. On the definition of mortality crises see Wrigley and Schofield, *Population History*, pp. 332–33. Weir’s findings (“Life Under Pressure,” pp. 39–40) support the view that crises had little cumulative effect on mortality in France after 1740.

TABLE 1
THE IMPACT OF CRISIS MORTALITY ON THE DEATH RATE IN ENGLAND AND
FRANCE, c. 1670–1720

Period	CDR* (a)	Crisis Mortality (b)	“Normal” mortality (c)	(a / b) · 100
France				
1680–1699	37.62	2.70	34.92	7.2
1700–1719	35.21	1.99	33.22	5.7
1680–1719	36.42	2.35	34.07	6.4
England				
1675–1700	30.29	1.66	28.63	5.5
1701–1725	27.79	0.06	27.73	0.2
1675–1725	29.04	0.86	28.18	2.9

*Crude death rate, per thousand population.

Note: “Crisis mortality” includes only excess deaths in years when mortality was more than 10 percent above average. In the French case this means 1693, 1694, 1709/10, and 1719.

Sources: Fogel, “Second thoughts,” p. 247; and Lachiver, *Années de misère*, p. 480.

aided by a summer of oppressive heat and storms, whereas the notoriously cold winter of 1708/09 marked the onset of the second. As with all famines, the victims were overwhelmingly the landless and the poor. In an era when medical technology was primitive and infectious diseases endemic, most perished from illnesses such as typhoid fever and dysentery rather than from starvation per se.¹³

In the earlier famine, mortality mounted in the fall and winter of 1693 and remained high for much of 1694. Marcel Lachiver has put the human toll of this famine at about 1.3 million, out of a total population of 22 million.¹⁴ Lachiver believes that this would make it, in terms of French lives lost, a proportionately greater disaster than either the Revolutionary and Napoleonic Wars (1792–1815) or the First World War (1914–1918). Its demographic toll also dwarfed that of all subsequent famines in France.¹⁵ Like most major famines on record, it also brought significant reductions in the numbers of births and marriages. Though no part of France escaped unscathed, excess mortality varied significantly across the country.¹⁶

The famine of 1709/10 struck at a time of grave economic crisis and ongoing warfare. Deaths began to mount in the summer of 1709 and would

¹³ Deyon, *Amiens*, pp. 13–16; Lachiver, *Années de misère*, pp. 115–18; Monahan, *Year of Sorrows*, pp. 71–73; and Goubert, *Louis XIV*, pp. 193–200, 253–60. On the causes of famine mortality see Mokyr and Ó Gráda, “Famine Disease.”

¹⁴ As explained below, this estimate (unlike that in Chevet, “Crises démographiques,” p. 130) assumes significant underregistration of burials.

¹⁵ Lachiver, *Années de misère*, p. 453; but see too Dupâquier, “Review of Lachiver.”

¹⁶ Lachiver, *Années de misère*, pp. 200–05; and Cabourdin et al., “Crises démographiques,” pp. 206–09.

last into the first few months of 1710, by which time exposure had joined disease as a major cause of death.¹⁷ Lachiver's aggregate data imply an excess mortality substantially lower than in 1693/94 (about 0.6 million).¹⁸ In this case too the numbers of births and marriages also fell.

The estimates of excess mortality just reported take no account of the longer-term impact of famine on mortality. A common feature of such disasters is that some of the short-term losses are eventually regained as mortality dips below average in subsequent years, while births and marriages rebound. In assessing the demographic impact of famines, taking account of both immediate and longer-term response is crucial. However, as argued by David Weir, in assessing the economic impact of a harvest failure there is a strong case for analyzing mortality separately.¹⁹ This allows the analysis to focus on the impact of food supply and markets, as captured by food prices, on mortality. In what follows, therefore, our concern will be with the short-run (one-year or two-year) demographic impact.

Data kindly supplied by the Institut National d'Études Démographiques (INED), from its ongoing inquiry into population trends in prerevolutionary France, allow us to track these crises region-by-region.²⁰ The INED project, like the Cambridge Group's estimates of the precensal population of England, is based on counts of literally millions of records extracted from parish registers across France. While based on a large sample of parishes, these data nevertheless have their limitations; pending further refinement and correction, they must be handled with care.²¹ Nevertheless, the INED database casts new light on what has been hitherto a "demographic dark age" and reveals some interesting patterns for the famine years.²² We define the

¹⁷ Monahan, *Year of Sorrows*, pp. 125–53; and Lachiver, *Années de misère*, pp. 361, 381–82.

¹⁸ The famine's wartime context accounts for the contemporary nationalist claim, repeated by Herlaut ("Disette de pain," p. 99), that there were no deaths from starvation in the kingdom of France in 1709.

¹⁹ Weir, "Markets and Mortality," pp. 202–03.

²⁰ Our thanks to INED and particularly to Alain Blum for providing us with these data. The data set used here is an improvement on that used in Cabourdin et al. ("Crises démographiques," figs. 69–72), which lacked information on several *départements*.

²¹ In their contribution to *Histoire de la population française* in 1988 the leaders of the INED survey noted the provisional status of their data, but doubted whether further refinement would modify the general outlines (Biraben, Blanchet, and Blum, "Mouvement," pp. 145–46), while Cabourdin, Biraben, and Blum ("Crises démographiques," p. 208 and figs. 69–72) asserted of the crisis of the 1693/94, "on peut mieux définir la géographie de cette crise, les données étant pratiquement complète à cette époque." [One can define the geography of this crisis more precisely, the data being almost complete in this period.] For more on the shortcomings of the data see Séguy, "Enquête," pp. 198–204; and Bonneuil, "Traitement." Appendix 1 of Ó Gráda and Chevet, "Market Segmentation," offers a few examples from the 1700s of the data at their most problematic.

²² In his indispensable monograph on the famines of 1693/94 and 1709/10, Lachiver relied on an earlier version of the INED database for estimates of their short-run demographic impact. Comparing his aggregates and ours suggests that Lachiver took the INED estimates of births and marriages as given. However, he seems to have assumed that only 70 percent of deaths were recorded, and therefore adjusted the estimates of total deaths upwards accordingly to generate "plausible" estimates of population change for the period 1680–1720. Comparing the ratios of our regional totals to those in Lachiver

mortality toll in the earlier famine as the proportionate change in deaths in 1693 and 1694 over the annual average for the 1680–1692 period. Our results suggests that west of a line from Bordeaux to Le Havre, southeast of a line from Carcassonne to Geneva, and northeast of a line from Geneva to Lille, the impact of the disaster on baptisms and burials was relatively minor. Excess mortality was highest in today’s southwestern *départements* of Landes, Lot-et-Garonne, Gers, Cantal, and Lozère, and (rather anomalously) in the northern *département* of Nord.²³ In these *départements* estimated excess mortality in 1693/94 was over four times that of a typical pre-famine year. By contrast, in *départements* such as Finisterre and Côtes-du-Nord in the west, Var in the south, and Moselle in the east, the INED data set suggests that mortality was *less* than the norm in 1693/94.

In the case of 1709/10 excess mortality is measured similarly, but using as a base the annual average of deaths between 1697 and 1708. The regional distribution of mortality in 1709/10 was quite different than in 1693/94.²⁴ This time *départements* in central France were most affected, and much of the southwest less affected than before. The west of France, less dependent on wheat, was again least affected; it had also escaped rather lightly in 1649–1652 and in 1660–1662.²⁵

In Figure 1 and Table 2 we follow Lachiver by aggregating France’s *départements* into seven regions of roughly similar size (dubbed North, Center, West, East, Southeast, Southwest, and Seine/Loire), in order to map the regional impact of the famines of 1693/94 and 1709/10 on births, marriages, and deaths.²⁶ This strategy has the added advantage of reducing the “noise” caused by famine-induced migration between neighboring *départements*. We chose 1680 as a starting date, since the data are much sparser and less reliable before then. Clearly, the two famines varied significantly in their impacts across regions. The first was most deadly in central and southwest France; by comparison the east and west escaped relatively lightly. The second hit the central and eastern regions hardest; the southeast was badly affected, but the west again escaped lightly. Another significant difference between the two famines is the relative importance of mortality, on the one

(*Années de misère*, p. 480) over the period 1680–1695 yields the following results:

	Average ratio	Standard deviation
Death rate	0.704	0.008
Birth rate	0.981	0.005
Marriage rate	0.983	0.010

²³ However, the data for Nord seem particularly shaky.

²⁴ The correlation between estimated excess death rates across *départements* is only 0.12.

²⁵ Compare Goubert, “Recent Theories,” p. 470; and Croix, *Bretagne*, pp. 323–45.

²⁶ Lachiver, *Années de misère*, p. 481. Seine-et-Oise is excluded in 1693/94, and Corsica in both periods.

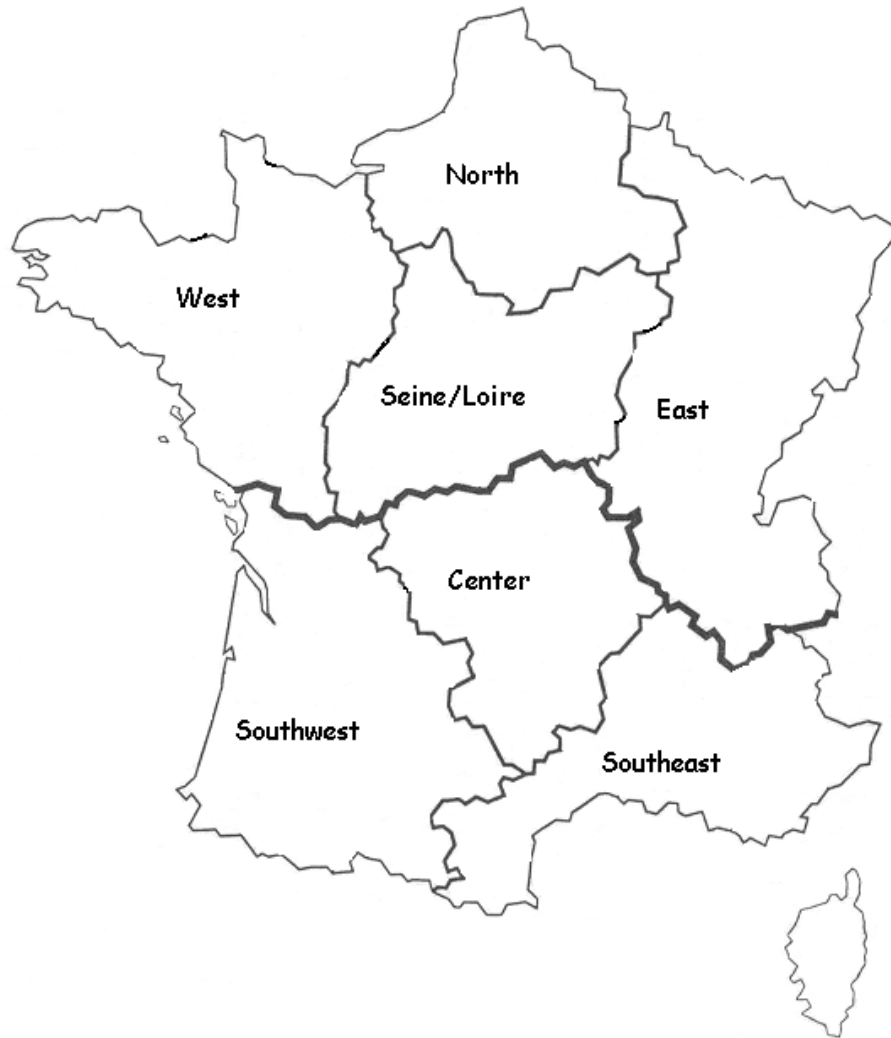


FIGURE 1
THE REGIONS OF FRANCE

Note: The regional boundaries follow those used by Lachiver.

hand, and of birth and marriage rates, on the other. In 1693/94 the shock to the death rate was five times that to the birth and marriage rates, but in 1709/10 all three rates changed by comparable orders of magnitude. Note too that in 1709/10 the birth rate began to fall already in the first calendar year, presumably because the cold spell that augured the famine occurred in January 1709.²⁷

²⁷ Compare Monahan, *Year of Sorrows*, p. 126, on Lyon in 1709/10, where the proportionate impact on mortality was much greater. However, the mortality totals in urban registers such as Lyon's are likely to be inflated by crisis immigration from rural areas.

TABLE 2
 IMPACT OF THE FAMINES ON BIRTHS, MARRIAGES, AND DEATHS
 (percentage change, by region)

	East	Center	North	Seine-Loire	Southeast	Southwest	West	Total
1693/94								
Baptisms								
1694	-21.7	-31.4	-35.1	-29.5	-6.5	-42.6	-14.0	-26.0
1695	-6.0	-20.7	-1.4	5.1	-3.0	-5.1	6.9	-2.7
1694-95	-27.7	-52.1	-36.5	-24.4	-9.5	-47.7	-7.2	-28.7
Deaths								
1693	32.0	84.7	61.9	61.2	-11.8	138.6	7.8	51.1
1694	30.5	131.0	125.6	149.2	23.9	215.5	37.7	98.8
1693-94	62.5	215.7	187.5	210.4	12.1	354.1	45.5	149.9
Marriages								
1693	-18.9	-36.5	-29.8	-24.8	-5.3	-26.3	-5.3	-19.8
1694	-6.8	-25.4	-13.1	-26.3	-8.6	-2.6	-4.1	-10.9
1693-94	-25.7	-61.9	-42.9	-51.1	-13.9	-28.9	-9.4	-30.7
1709-1711								
Baptisms								
1709	-7.0	-5.2	-17.4	-14.6	-11.6	-10.0	-17.9	-11.3
1710	-30.1	-32.5	-46.7	-44.0	-36.3	-41.0	-20.3	-34.5
1711	2.6	-9.9	-3.8	-17.8	-1.5	-20.7	-10.2	-8.5
1709-11	-34.4	-52.1	-36.5	-76.4	-49.4	-71.7	-48.4	-54.3
Deaths								
1709	62.2	74.7	39.6	43.6	28.3	52.1	27.5	43.0
1710	78.8	96.9	33.0	54.9	88.6	45.8	10.1	47.5
1709-10	140.0	171.6	72.6	98.5	116.9	98.0	37.6	90.5
Marriages								
1709	-47.0	-37.8	-64.6	-63.2	-31.2	-45.0	-38.7	-40.7
1710	-9.3	-27.5	-50.6	-49.7	-0.9	-43.4	-5.2	-27.4
1709-10	-56.3	-65.3	-115.2	-112.9	-32.2	-88.2	-43.9	-68.1

Notes: Our bases are the 1680-92 and 1697-1708 averages. The estimates for France as a whole use Lachiver's estimates of population by region in 1685 as weights.

FRENCH GRAIN MARKETS

I cannot approve of the course you seem to have taken, which is to prevent by all manner of means the shipment of grain from your region: is it natural that you should want to keep the price of grain in Touraine at 14, 15, or even 18 livres per setier, when it is going to cost 25 to 30 livres in Blois and Orleans and 35 to 40 livres in Paris?

Contrôleur Général Orry, 1740²⁸

The role of markets in seventeenth- and eighteenth-century French agriculture has provoked considerable historiographical controversy. An orthodoxy stressing the lack of markets has invited a revisionist critique which

²⁸ Cited in Bricourt et al., "Crise de subsistance," pp. 317-18.

highlights the market orientation of larger producers and the food requirements of a sizeable non-agricultural population, both rural and urban. Against Fernand Braudel's depiction of "a rustic France, partitioned in its provinces," or Abel Poitrineau's account of the "attenuated autarky" of the eighteenth-century Basse-Auvergne, have been pitted the counterclaims of scholars such as Emmanuel Le Roy Ladurie, Jean-Pierre Poussou, and Philip Hoffman, who have argued for modest agricultural progress based in part on increased commercialization. Meanwhile, Robert Allen's political arithmetic implies that agricultural output per worker in late-seventeenth-century France was less than it had been two centuries earlier, and less than two-thirds of the levels attained in the Low Countries or in England around 1700.²⁹

A resolution of this debate is complicated by the lack of hard data.³⁰ Yet it seems fair to say that traditional accounts have underestimated the commercialization of *ancien régime* agriculture. Certain activities, such as wine making and cattle raising, had strong commercial foundations from an early date. Moreover, local trade between provincial cities and their rural hinterlands, and between "highland" and "lowland" zones, were important in both the seventeenth and eighteenth centuries. Thirdly, improvements in communications almost certainly increased the proportion of output marketed over time.

The case for autarky becomes more persuasive when the focus shifts to the grain trade. Most specialists would probably agree with Jean Meuvret's characterization of the grain trade in the era of Louis XIV as having "reduced itself to transactions enclosed within a restricted area."³¹ In the Beauvaisis in that period there was enough grain in good years to feed its urban population, but in bad years importing grain from areas in relative or absolute surplus was not an option; "the grain-dependent Beauvaisis of the seventeenth century was in effect a closed economy." As a result, when the harvest was bad the poor died throughout the region. Even Poussou, a severe critic of the traditional self-sufficiency school, concedes autarky insofar as the grain trade was concerned, and particularly so in times of subsistence crises. Weir's reworking of Labrousse's data on wheat prices for the period 1756–1790 finds high correlations between prices in neighboring regions, but insignificant correlations between prices in regions

²⁹ Braudel, "Économie française," pp. 65–69; Poitrineau, *Vie rurale*, pp. 426–27; Le Roy Ladurie, "De la crise ultime," pp. 396ff; Poussou, "Agriculture et commerce"; Hoffman, *Growth*, pp. 179–84; and Allen, "Economic Structure," pp. 18–21.

³⁰ One indirect indicator of the weak integration of markets in this period is the increase in freight transport in the early nineteenth century. J.-C. Toutain's estimates of aggregate freight transported imply a big rise—from 3.1 billion to 5.0 billion ton-kilometers—between 1830 and 1845/54. The increase from 0.5 billion to 1.66 billion ton-kilometers in the share carried by water and rail, the modes most likely to carry grain, was more impressive still (data cited in Price, *Modernisation*, p. 28).

³¹ Meuvret, *Problème des subsistances (Texte)*, pp. 142–43.

distant from each other. Weir's results identify regional trading networks, though not a national market in the eighteenth century.³²

The case for segmented grain markets rests on the high transactions costs imposed by geography, poor transport infrastructure, and public policy. Given high transport costs, we would expect little correlation between grain prices in distant cities, except perhaps those that were maritime or river ports. The long-distance shipment of grain depended mainly on inland navigation and coastal routes, but in the seventeenth and eighteenth centuries France's inland waterways were in a backward state. Historians of transport note that navigation on the Loire was uncertain and sometimes perilous, while traffic on the Rhône was interrupted for several months of the year by floods or low water. Even the busy Seine was obstructed by weirs, islands, and sandbars; the journey by river from Beauvais to the sea—a distance of barely 100 kilometers—took two days through narrow and muddy channels. The Canal du Midi, which linked Toulouse and the Mediterranean, had been completed as recently as 1681, while plans to link the Rhône and the Rhine, the Loire and the Yonne, and the Saône and the Loire were far in the future. It has been reckoned that in the second half of the eighteenth century shipping grain a hundred leagues (i.e., 400 km.) doubled its price.³³ The chaotic profusion of weights and measures and of customs as to how grain was measured and paid for are also sometimes seen as impediments to trade—though these could just as well be seen as symptoms of autarky rather than its cause.³⁴

Though the case for market segmentation is strong, the commercial character of grain production in regions such as Burgundy, the Beauce, and the Vexin, or in the hinterland of great cities such as Paris or Lyon, must not be forgotten. It should also be noted that though exports were (in principle at least) controlled, the internal market for grain in *ancien régime* France was open to all. The Crown supported free trade in grain between the regions, and merchants could purchase where they chose without paying the tolls and duties imposed on other goods. Nevertheless, contemporary observers of commercial life such as l'Abbé Galiani and Jacques Savary highlighted the expense and risks of the trade. They claimed that it was unlikely to be profitable except in times of dearth, when the uncertainties were greatest. Thus even when the authorities supported free trade, the necessary commercial networks for it might not be forthcoming.³⁵

³² Goubert, *100,000 provinciaux*, pp. 127–28; Poussou, "Agriculture et commerce," p. 105; and Weir, "Markets and Mortality," pp. 209–11.

³³ Goubert, *100,000 provinciaux*, p. 110; Price, *Modernisation*, pp. 28–31; Grantham, "Jean Meuvret," pp. 188–89; and Szostak, *Role of Transportation*, pp. 55–60, 236–37.

³⁴ Young, *Travels in France*, vol. 2, pp. 43–47; Kaplan, *Provisioning Paris*, pp. 87–88; Meuvret, *Problème des subsistances (Texte)*, pp. 141–43; and Aymard, "Autoconsommation et marchés."

³⁵ Grantham, "Espaces privilégiées"; Miller, *Mastering*, pp. 1–49; Bernard, *Emerging City*, pp. 251–59; and Kaplan, *Provisioning Paris*, pp. 83–85.

Regional price data published by Meuvret and Ernest Labrousse broadly support the case for weakly integrated grain markets in the late seventeenth century, and no great improvement before the Revolution.³⁶ Meuvret concedes that when famine threatened, the incentives—or indeed the pressures—to trade might be different. Yet he concludes that such crises could not serve as the basis for an enduring trade on a national or international basis; because famines could not be predicted and rarely lasted long, “invariably they faced a commercial organism ill-equipped to deal with them.”³⁷ The historiography tends to emphasize the constraints on trade during famine, implying that the increasing incentives to trade were apparently outweighed in the aggregate by increasing pressure not to trade. In accounts of actual or threatened famines under the *ancien régime*, the struggles over grain between the monarchy, the cities, and the supplying regions are highlighted. Though the king’s comptroller-general generally favored unfettered trade between the regions, and the metropolitan authorities sought to ensure an adequate supply for the cities, the provinces deployed a range of strategies to frustrate such efforts. For cities such as Paris and Lyon, “free trade” meant their right to import freely from traditional grain-producing regions such as the Vexin, the Beauce, or Burgundy, and indeed to seek grain further afield in the south and west. Urban authorities also forced bakers to accept cuts in their margins, and “invited” individual proprietors and merchants to bring their grain to market. Consumers in producing regions protested in turn, and sought to prevent the export of “their” grain.

Meuvret does not dwell on the operation of markets during famines, but there is an earlier literature on the subject, summarized by Germain Martin. Assessments ranged from the traditional belief that “the odious speculation of the monopolizers greatly aggravated the evil,” to the Enlightenment view that the arrest of alleged hoarders in 1693 and 1709 was “a sure way of preventing the commerce that would relieve the people.”³⁸ Martin himself adopted an eclectic position, conceding that there was a food supply problem but also pointing to mass panic and to the political clout of certain traders and army suppliers as factors. Though it makes sense to distinguish between pure market failure and the sort caused by political intervention, one form of failure may lead to another. Indeed Martin claimed that inaccurate and overly pessimistic forecasts of supplies and harvests on the part of officials and producers terrified the poor, leading to “exaggerated” increases in price. Other accounts of these and other *ancien régime* famines highlight how threats of food riots and sabotage militated against free trade. The masses were not alone in blaming grain merchants and bakers for their

³⁶ Meuvret, *Problème des subsistances (Notes)*, pp. 118–19, 130.

³⁷ Meuvret, *Problème des subsistances (Texte)*, pp. 142–43.

³⁸ Martin, “Famines,” p. 153.

plight: in April 1709 a royal declaration pointed the finger not at a grain shortage, but at “the greed of those who seek to profit from the misery of the masses.”³⁹

Accounts of the famines of 1693/94 and 1709/10 feature these classic patterns. Local political bosses (*intendants*) sought to prevent, or at least limit, the movement of grain out of their jurisdictions. The authorities in Burgundy, Provence, and Languedoc imposed prohibitions for a time on the sale of grain to merchants from the bigger cities, and boats were stopped or seized in several of the main river ports. Grain shipments out of Burgundy ceased after November 1693, its refusal to supply Lyons aided and abetted by the comptroller-general who hoped to use it to supply the army’s needs. Guards were posted at the gates of Le Mans to prevent beggars from entering and grain from leaving. Some merchants were allegedly deterred from shipping for fear of being attacked, or else refused to purchase due to rumors that the king was about to tax grain. Regions in relative plenty, such as the west, were reluctant to let grain move for fear of another poor harvest in the following year. Officials and merchants sometimes colluded in lying about stocks in hand. In more remote regions, such prohibitions provided no respite, nor was there any prospect of finding supplies elsewhere.⁴⁰ The qualitative evidence of trade destruction is strong. However, given the lack of data on output, crop yields, and internal trade, the discussion has been conducted in a statistical vacuum. Indeed, impressionistic accounts may well create a false impression, exaggerating the degree of trade destruction.⁴¹

SUPPLY AND PRICE

Over two decades ago, when rationalizing England’s open fields as a risk-reducing strategy, D. N. McCloskey argued that in medieval England it took a harvest deficit of 50 percent to produce a “disaster.”⁴² How did the harvest shortfalls that produced these French “disasters” compare? Hard data on aggregate and regional agricultural output and crop yields are lacking for this period. The proxy evidence from the tithe (an ecclesiastic tax levied on agricultural output) is disappointing, being comprehensive neither by region nor by agricultural product.⁴³ In the northern villages of Onnaing and Quarouble analyzed by Michel Morineau, where the rights to the tithe were auctioned off parcel-by-parcel on the eve of the harvest (and should

³⁹ Martin, “Famines,” p. 168; Monahan, *Year of Sorrows*, pp. 40–41; and Herlaut, “Disette de pain,” p. 25. For a perspective on market manipulation by the authorities based on twentieth-century Africa see Bates, *Markets and States*.

⁴⁰ Lachiver, *Années de misère*, pp. 140–45; Usher, *History*, pp. 332–38; Bouton, *Maine*, pp. 570–71; and Herlaut, “Disette de pain.”

⁴¹ The history of the grain trade in and out of Ireland during the Great Famine of the 1840s may offer a parallel here. Popular accounts of that trade dwell on the export of wheat and oats at the height of the famine, but ignore the far bigger inflow of maize.

⁴² McCloskey, “English Open Fields,” pp. 141–45.

⁴³ Le Roy Ladurie, “Dîmes”; and Hoffman, *Growth*, pp. 83–84.

TABLE 3
NORMAL AND FAMINE CONSUMPTION IN 1693/94
(thousands of *setiers*)

Region	Normal Consumption	Price Change over 1670–1690 Average (percentages)		Implied Consumption			
		1693	1693/94	1693		1693–94	
				$e = -0.2$	$e = -0.5$	$e = -0.2$	$e = -0.5$
North	6,548	185	152	4,125	491	4,557	1,572
West	9,675	93	64	7,875	5,176	8,437	6,579
Seine–Loire	4,414	221	132	2,463	0	3,249	1,501
East	7,435	155	146	5,130	1,673	5,264	2,007
Center	5,154	133	86	3,783	1,727	4,268	2,938
Southwest	6,886	91	76	5,633	3,752	5,839	4,269
Southeast	3,930	68	67	3,396	2,594	3,403	2,613
Total	44,042			32,405	15,413	35,017	21,479

Notes: Normal consumption derived from Lachiver, *Années de misère*, p. 481. The price increases are averages for markets on which data are available in the region in question. e is the price elasticity of demand.

therefore presumably proxy the quality of the harvest), there is at best only a faint echo of the famine of 1693/94, and the returns for 1709 are missing.⁴⁴ Even continuous data on local yield ratios and rent payments from estate accounts are elusive. In these circumstances, wheat prices offer an alternative, rough-and-ready way of estimating the aggregate harvest shortfall in 1693/94 (Table 3).

These estimates have required some simplifying assumptions. Our calculations refer to wheat supplies only; they include imports and exclude exports. We assume that the price of wheat in the different regions also reflects the prices and supplies of substitute grains. Wheat was already the most important breadgrain in the Paris region and in most major French cities in the late seventeenth century, but elsewhere rye and barley took precedence, particularly in the diet of the poor. However, since the price movements of all grain crops were closely correlated, concentrating our analysis on wheat seems permissible.⁴⁵ We assume that consumption per head in an average year in all seven regions was two *setiers* (about 3.3 bushels) of wheat or its calorific equivalent.⁴⁶ This implies an annual consumption or net output of

⁴⁴ Morineau, *Faux-semblants*, pp. 159–60.

⁴⁵ Kaplan, *Provisioning Paris*, pp. 41–48; and Lachiver, *Années de misère*, pp. 119–23.

⁴⁶ Kaplan (*Bakers of Paris*, pp. 445–47), on the basis of a canvass of the contemporary literature, suggests an average grain consumption of two to three *setiers* per capita per annum in the eighteenth century. Necker and Moheau imply two *setiers*, the estimated used above. However, Vauban and others believed three *setiers* was the norm till the 1760s. Arthur Young also assumed per capita consumption of three *setiers* per head.

44 million *setiers*;⁴⁷ in Table 3 we have divided this total between our seven regions in proportion to their populations.

Our price data are simple averages of available data for towns and cities in each region (for further details see below). We assume the prices reflect supplies (whether harvested or imported), following a tradition that dates back to Charles Davenant and Gregory King.⁴⁸ The demand schedule implied by their data (sometimes dubbed King's Law) may be approximated as $Q = 1.000P^{-0.403}$, where Q is supply, P is price, and -0.403 is the price elasticity of demand. Fogel's analysis of historical crop and yield data suggests a much lower demand elasticity than this ($e = -0.183$), whereas Karl-Gunnar Persson has argued for the higher figure of -0.6 .⁴⁹ In Table 3 we report estimates based on elasticities of -0.2 and -0.5 . Clearly, the outcome is quite sensitive to the elasticity assumed. The aggregate harvest shortfalls range from 26 to 65 per cent in 1693, and from 20 to 51 per cent in 1693 and 1694 taken together.⁵⁰ Given the low yield ratios achieved in late-seventeenth-century France, that a shortfall of one-fifth to one-quarter should have produced such a famine is not impossible; yet the outcome may lend greater plausibility to an elasticity closer to the -0.4 implied by Gregory King.

FAMINE AND THE LAW OF ONE PRICE

Par égoïsme, par calcul, par instinct, chacun cherche à se refermer sur soi.

Marcel Lachiver⁵¹

The *spread* of prices in normal and in famine times is also of interest. The Law of One Price holds that where markets are well-integrated, persistent price differences between regions stem solely from transport costs (T). If markets continue to be integrated during a famine, and the transaction costs of shipping grain rise no more than grain prices, then arbitrage should ensure that the coefficient of variation of grain prices does not rise.⁵² However, the bad weather sometimes associated with famine conditions might increase T , as would the disruption of trade by legislation or "moral economy."

⁴⁷ Note that Quesnay (*Quesnay et la Physiocratie*, p. 461) calculates "à peu près 45 millions de *setiers* de blé."

⁴⁸ See Fogel, "Second Thoughts."

⁴⁹ Fogel, "Second Thoughts," pp. 248–49; and Persson, *Grain Markets*, pp. 50–54. Fogel notes that allowing for the presence of carryover stocks raises the elasticity. On the question of storage in early modern Europe see Persson, *Grain Markets*, ch. 3; and McCloskey and Nash, "Corn at Interest."

⁵⁰ Note that an elasticity of -0.5 implies a negative harvest (here reported as zero) in the Seine/Loire region in 1693!

⁵¹ [By egoism, by design, by instinct, everyone is reduced to relying on one's self.] Lachiver, *Années de misère*, p. 141.

⁵² Ó Gráda, "Markets and Famines."

Annual price data allow some insight into the question whether grain markets became more or less segmented during the famines of 1693/94 and 1709/10. Annual wheat-price series are available for a broad cross-section of French towns and cities. Here we use data on 40 market towns and cities for some insight into the question whether grain markets became more or less segmented during the famines of 1693/94 and 1709/10.⁵³ The towns represent one-third of France's 90 *départements*, and are well spread across the country. Our crises had an impact on the correlation between wheat prices in these towns in year t and year $t+1$. Over the period 1671–1750 the average year-to-year correlation was +0.797, with a standard deviation of 0.152. However, the correlation plummeted from +0.770 in 1692/93 to +0.322 in 1693/94 and +0.392 in 1694/95, before recovering to +0.722 in 1695/96. Again the correlation dropped from +0.950 in 1706–/07 to +0.271 and +0.233 in the following two years, rising to +0.599 again in 1709/10. These falls surely suggest a disruption of normal trade patterns.

Even in normal times the coefficients of variation were high. Our price data for the same 40 markets (Figure 2) show significant further rises in the coefficients of variation of wheat prices in 1694 and 1695, and in 1709 and 1710 (and also in 1740). While the rises in 1709 and 1740 might be attributed to the impact of bad weather on shipping costs, those in other years cannot be so readily accounted for. Overall, the outcome is consistent with some balkanization of markets. It is far less dramatic, though, than that found for potato markets in Germany in the early nineteenth century or grain markets in Kenya in the 1980s.⁵⁴ The result also points to an asymmetry (and therefore a weakness) in this test of market failure: where the coefficient of variation remains low or falls, there is a case for markets working well; but if the coefficient increases, it may well be impossible to distinguish between legislative interference and higher transport costs as the cause.

AN ERROR-CORRECTION APPROACH

The Law of One Price stipulates the presence of an equilibrium price vector describing the markets or regions of an economy. However, prices will typically deviate from their equilibrium values. The arrival of a shipment in grain in Region A, for example, might cause a temporary drop in

⁵³ The underlying database, which was kindly supplied by David Weir of the University of Michigan, refers to the following towns and cities: St Etienne, Boen, Limoges, Charleville, Lyon, Langres, Bourg-en-Bresse, Strasbourg, Grenoble, Douai, Rozoy-en-Brie, Montdidier, Pontoise, Chaumont, Paris, Beauvais, Lille, Abbeville, Chartres, Chateaudun, Poitiers, Annonay, Romans, Buis-les-Baronnies, Toulouse, Aubenas, Draguignan, Pont-St-Esprit, Arles, Beziers, Aix, Pamiers, Angouleme, Montauban, Bayeux, Laval, Rennes, Saint-Brieuc, Bayeux, and Coutances.

⁵⁴ Ó Gráda, "Adam Smith and Amartya Sen."

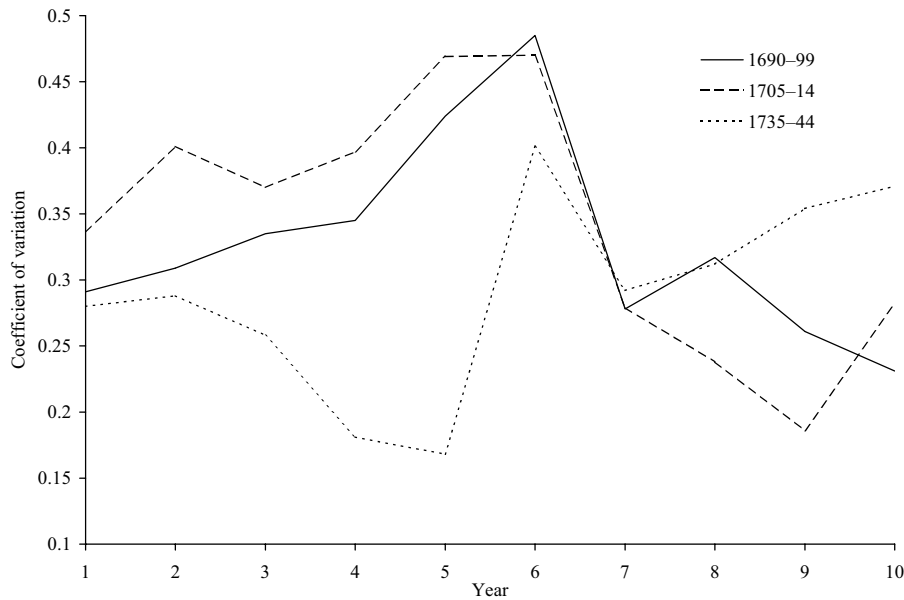


FIGURE 2
COEFFICIENTS OF VARIATION OF WHEAT PRICES BEFORE, DURING, AND AFTER
THREE FRENCH FAMINES

Source: See the text.

prices there relative to regions B and C, while merchants arrange the trades that restore the equilibrium price vector. If markets are functioning properly, however, significant deviations from equilibrium prices will be quickly arbitrated away. Did grain markets in France in the 1690s and 1700s function in this manner? Were they slower to respond or adjust in times of famine than in normal times? Our answer is constrained by the available data: continuous high-frequency price data are scarce for this period. The problem suggests an error-correction-model (ECM) approach to the hypothesis that the speed of reaction was slower during crises than either before or after. Our choice of model has been governed by the nature of our data, but it is a simpler variant of one widely applied in the literature of agricultural and development economics.

In this exercise we compare the evolution of prices in different pairs of markets using monthly price data.⁵⁵ Such data are available for Paris for the

⁵⁵ In Ó Gráda and Chevet, "Market Segmentation," we also worked with quarterly price data for Paris, Toulouse, Winchester, and Rozay-en-Brie for the period 1675–1745. Rozay was an important source of supply for Paris. Since Parisians relied on their supply of grain or flour from a well-defined hinterland stretching about 200 km in all directions around it (Chevet and Guery, "Consommation et approvisionnement"; and Kaplan, *Provisioning Paris*, pp. 88–98), in normal years there would have been little or no trade in grain between Paris and the other markets. We included Beveridge's wheat

period 1680–1698 and for Toulouse for 1680–1715. We also have monthly series for Pontoise, a town of a few thousand people around 1700 and the “nerve center” of the Vexin region to the immediate north of Paris; for Grenade-sur-Garonne, a small market town about 30 km downstream from Toulouse; and for Angoulême, the main urban center of the Angoumois region. (In the case of Angoulême some gaps are plugged with data from nearby Cognac.) In the 1690s and 1700s there would have been little direct communication between Toulouse and Angoulême, though they were linked by navigable river and coastwise via the major port city of Bordeaux. Angoulême was a town of less than 10,000 souls in 1700, while Toulouse contained about four times as many. The second pair, Paris and Pontoise, are within 20 km of each other, and were linked by regular trade. Pontoise was one of the main grain markets in the Paris basin.⁵⁶ The monthly series for Pontoise used here also leaves something to be desired, being interpolated from a quarterly series for nonfamine years.

Before estimating an ECM, the individual price series had to be tested for stationarity. The series used were differences in the logs of prices in the markets mentioned above, and the gaps between the logs of price pairs. In all cases the hypothesis that the individual series had a unit root could be firmly rejected. We then proceeded to estimate the following simple and familiar representation of the error-correction model⁵⁷

$$\Delta P_{i,t} = a_t + b\Delta P_{A,t} - c(P_i - P_A)_{t-1} + e_{it} \quad (1)$$

where P is the log of price, A is Region A, and i is any other region. Writing the model in this way offers the intuitive interpretation that agents adjust to $P_{i,t}$ from $P_{i,t-1}$ in response to changes in P_A (with b measuring the short-run effect) and the previous disequilibrium $(P_i - P_A)_{t-1}$. The coefficient b measures how strongly prices in A and i move together; the coefficient c captures the error-correction feedback element; it measures the speed of adjustment of P_i to a discrepancy between P_i and P_A in the previous period. In regularly functioning markets we would expect $0 < b < 1$ and $c < 0$. Representing the years of severest harvest failure and famine—1693/94, 1709/10,

price series for Winchester (with shillings per quarter converted to *livres per setier*) in order to see if there were linkages, direct or indirect, between the Paris and a not-to-distant English market in times of crisis. We note John Chartres’s argument (“Marketing,” pp. 459–65) on the basis of an analysis of regional wheat price data that an integrated market for wheat, “defined as one which reacted fairly evenly to disequilibrating factors,” was already present in England by the 1690s. We are very grateful indeed to David Weir for the monthly series used here (see his “Markets and Mortality,” pp. 233–34).

⁵⁶ Kaplan, *Provisioning Paris*, p. 89.

⁵⁷ For a good introduction to ECMs see Alogoskoufis and Smith, “On Error Correction Models.” In Ó Gráda and Chevet, “Market Segmentation,” the results of experimenting with slightly different specifications and lags are presented, but the outcome is not materially altered. A more complex model that allows for shifting transportation costs (see Persson, *Grain Markets*, ch. 5) will not serve here, since data on transport costs are lacking.

and 1740Q3–1741Q4—by interaction dummies, we derive an amended version of equation 1

$$\Delta P_{i,t} = a_i + b\Delta P_{A,t} - c(P_i - P_A)_{t-1} + dFAM1 - eFAM2 + e'_{it} \quad (1')$$

where $FAM1 = [FAMDUM \cdot \Delta P_{A,t}]$

and $FAM2 = [FAMDUM \cdot (P_i - P_A)_{t-1}]$

includes a new variable, *FAMDUM*, which is set equal to unity for every month in 1693/94, 1709/10, and 1740, and zero otherwise. The interaction terms *FAM1* and *FAM2* allow us to see whether markets behaved differently during the crisis than in more normal times. A positive coefficient on *FAM1* would indicate that contemporaneous price movements were more synchronized during the crisis than normally; a positive coefficient on *FAM2* would suggest either that markets adjusted more sluggishly during famines (if the regional economies in question were normally quite integrated), or possibly that they were adjusting more readily (in the case of markets that were normally quite segmented).

An initial analysis of quarterly data highlighted the close linkage between the markets of Paris and Rozay in this period.⁵⁸ Co-movements were strong, and the adjustment term big and negative. The coefficients on *FAM1* and *FAM2* suggested that co-movements were weaker during the famine years, but adjustments to price gaps stronger. Not surprisingly, Toulouse's links with Paris were much weaker. The positive coefficients on *FAM1* suggested greater synchronicity during famines, but those on *FAM2* were consistent with no "famine effect." On the whole, the quarterly data offer little support for the hypothesis that markets performed "worse" in famine years than in normal times.

The monthly data refer to wheat prices between the 1680s and the 1710s. All the series were first tested for stationarity and in all cases the hypothesis that the series had a unit root could be firmly rejected. Tables 4–7 describe co-movements and the speed of response in four pairs of markets, and how the famine affected them. The results confirm our expectations about these markets in normal years. The co-movement terms are biggest for Toulouse–Grenade, followed by Paris–Pontoise, Toulouse–Angoulême, and Toulouse–Paris, and reflect the much weaker synchronization of prices in the last two pairs. Moreover, while the adjustment coefficients for Paris–Pontoise and Toulouse–Grenade are in the –0.2 to –0.5 range, those for Paris–Toulouse

⁵⁸ The results are reported in Ó Gráda and Chevet, "Market Segmentation."

TABLE 4
ESTIMATING AN ECM FOR TOULOUSE AND ANGOULÊME, 1680–1712

	[1] 1680–1712	[2] 1680–1699	[3] 1700–1712	[4] 1680–1712	[5] 1680–1699	[6] 1700–1712
CONST	–0.001 (–0.16)	0.003 (0.71)	–0.019 (–2.62)	–0.001 (–0.10)	0.003 (0.67)	–0.018 (–2.66)
ΔP_{TOUL}	0.299 –7.55	0.223 (4.25)	0.410 (6.99)	0.235 (4.81)	0.232 (3.94)	0.246 (2.93)
$(P_{ANG} - P_{TOUL})_{t-1}$	–0.054 (–3.57)	–0.040 (–2.24)	–0.143 (–4.12)	–0.05 (–3.20)	–0.038 (–2.02)	–0.137 (–3.98)
<i>FAM1</i>				0.195 (2.35)	–0.047 (–0.36)	0.377 (3.14)
<i>FAM2</i>				–0.057 (–0.95)	–0.040 (–0.57)	–0.217 (–1.86)
R^2	0.142	0.082	0.280	0.154	0.083	0.328
DW	1.53	1.60	1.51	1.55	1.61	1.60

Notes: *t*-statistics are in parentheses; *ANG* = Angoulême, *TOUL* = Toulouse.

and Toulouse–Angoulême are small (though always statistically significant).⁵⁹

Including the interaction variables for the famine periods produces some interesting results. Considering first Angoulême–Toulouse (Table 4), the coefficient on *FAM1* for the period 1680–1712 (0.195), and the associated reduction in the coefficient on ΔP_{TOUL} , suggest stronger co-movements during the famine months. However, this may simply reflect the power of the famine “signal” relative to the background noise. More to the point, the coefficients on *FAM2* are small and insignificant, which is consistent with the hypothesis that the response was no different during the crisis than in normal years. Dividing the period into two, however, it becomes clear that the reaction of wheat prices in 1709/10 was much stronger than in 1693/94. Including *FAM1* and *FAM2* in a regression for 1680–1699 hardly affects the overall picture, but the results for the second period suggest that markets were quicker to respond to shocks in 1709/10 than in normal years. In the case of Paris–Pontoise (Table 5), co-movements were not affected by the famine of 1693/94 but the coefficients on the *FAM2* terms indicate that the speed of adjustment increased considerably in those years. Comparing Toulouse and neighboring Grenade-sur-Garonne (Table 6) produces a very similar pattern to Paris–Pontoise: again the outcome is consistent with more powerful adjustment to emerging price gaps during the famine periods. Finally, co-movements in Paris and Toulouse (Table 7) were more clearly linked during the famines, but the speed of adjustment remained unaffected. In sum, there seems to be no evidence in these data to support the hypothesis

⁵⁹ This outcome is consistent with Weir’s finding (“Markets and Mortality,” pp. 209–11) that correlations between prices in different markets declined with distance.

TABLE 5
ESTIMATING AN ECM FOR PARIS AND PONTOISE, 1680–1698

	[1]	[2]
CONST	-0.023 (-3.45)	-0.018 (-2.68)
ΔP_{PARIS}	0.603 (10.65)	0.538 (7.35)
$D(P_{PONT} - P_{PARIS})_{t-1}$	-0.234 (-5.59)	-0.180 (-4.09)
FAM1		0.095 (0.83)
FAM2		-0.395 (-3.23)
R^2	0.368	0.399
DW	1.76	1.77

Notes: *t*-statistics are in parentheses. *PONT* = Pontoise.

that markets for grain performed “worse” during the two famines than in normal times. If anything, in Paris–Pontoise they seem to have performed “better” in 1693/94, and likewise in Angoulême–Toulouse in 1709/10.

CONCLUSION

We began our discussion with Adam Smith’s assertion that in the two centuries prior to 1776 no famine had arisen “[in] any part of Europe . . . but for the violence of government attempting, by improper means, to remedy the inconveniencies of a dearth.”⁶⁰ Smith’s claim hardly describes France in 1693/94 and 1709/10. Our analysis of regional and temporal variations in prices finds no support for the assertion that public meddling with markets led to the famines of those years. Instead it suggests that grain markets were thin and rather slow to cut emerging price gaps during the crises, but they were no more so than in noncrisis years. To the limited extent that markets moved grain from areas where it was relatively plentiful to areas where it was not, they probably alleviated aggregate suffering.⁶¹ To the extent that they facilitated consumption-smoothing across the harvest year in conditions of scarcity, they also reduced famine’s toll. In that sense Adam Smith was right.

In this respect there was a striking difference between the French famines of the 1690s and 1700s, on the one hand, and those in Bengal in 1942/43 and in Bangladesh in 1974 as described in widely-cited studies by Sen and

⁶⁰ Smith, *Inquiry*, p. 526.

⁶¹ This claim occludes distributional aspects à la Stolper–Samuelson: though a temporary embargo on food exports from a badly-affected region would reduce aggregate income, it might—failing other transfer mechanisms—increase the purchasing power, and thereby the survival chances, of the landless or near-landless.

TABLE 6
ESTIMATING AN ECM FOR TOULOUSE AND GRENADE-SUR-GARONNE, 1680-1712

	[1] 1680-1715	[2] 1680-1699	[3] 1700-1715	[4] 1680-1715	[5] 1680-1699	[6] 1700-1715
CONST	-0.033 (-8.08)	-0.044 (-7.50)	-0.025 (-4.28)	-0.031 (-7.68)	-0.041 (-6.94)	-0.023 (-4.20)
ΔP_{TOUL}	0.827 (27.16)	0.781 (18.62)	0.871 (19.88)	0.853 (24.01)	0.785 (16.65)	0.952 (17.93)
$(P_{GR} - P_{TOUL})_{t-1}$	-0.447 (-10.87)	-0.547 (-9.48)	-0.369 (-6.28)	-0.406 (-9.73)	-0.503 (-8.32)	-0.328 (-5.68)
FAM1				-0.038 (-0.57)	-0.078 (-0.76)	-0.061 (-0.60)
FAM2				-0.481 (-4.00)	-0.432 (-2.86)	-0.658 (-2.98)
R^2	0.641	0.615	0.678	0.656	0.629	0.704
DW	2.20	2.11	2.27	2.21	2.13	2.25

Notes: *t*-statistics are in parentheses. GR = Grenade, TOUL = Toulouse.

Ravallion, on the other. In Bengal and Bangladesh poorly functioning food markets would seem to have exacerbated mortality. In France, however, catastrophically poor harvests, the lack of poor relief, and the stresses of war were much more important. These contrasting outcomes warn against dogmatism and suggest the need for further case studies.

Finally, it is worth noting that the era of French famines did not come to an end with the famines described here, though their intensity certainly declined after 1710. In 1740/41, years of crisis throughout Europe, grain prices rose as much as in 1693/94 and 1709/10, but the impact on aggregate mortality was

TABLE 7
ESTIMATING AN ECM FOR PARIS AND TOULOUSE, 1680-1698
(dependent price: Toulouse)

	[1]	[2]	[3]
CONST	-0.021 (-2.06)	-0.021 (-2.09)	-0.016 (-1.51)
ΔP_{PARIS}	0.177 (2.75)	0.022 (0.27)	0.044 (0.53)
$(P_{TOUL} - P_{PARIS})_{t-1}$	-0.061 (-2.62)	-0.066 (-2.73)	-0.067 (-2.77)
FAM1		0.374 (2.93)	0.344 (2.71)
FAM2		0.023 (0.72)	0.022 (0.72)
S8			-0.041 (-2.00)
S9			-0.032 (-1.59)
R^2	0.053	0.092	0.117
DW	2.03	2.09	2.11

Note: *t*-statistics are in parentheses. TOUL = Toulouse. S8 and S9 are dummy variables for August and September, respectively.

comparatively light. In 1793/94 famine struck again, amid wartime conditions not unlike those obtaining a century earlier, but the harvest shortfall was almost certainly less and the total number of lives lost was much smaller. Greater market integration may help explain the difference, but transport costs between France's regions were still high on the eve of the railway age. In seeking to account for the disappearance of famine from France, the slow, gradual progress of the agricultural sector is a likelier factor.

Appendix 1: The Famines of 1650–1652 and 1661/62

The INED data set described in the text can be used to generate rough-and-ready estimates of excess mortality in these two earlier famines (Appendix Table 1). Unfortunately, continuous data are lacking for several *départements*. In this exercise *départements* lacking data for more than five years between 1640 and 1699 were omitted, but enough remained to instill some faith in the measures of excess mortality by region given below.⁶² Note that in order to capture the relative impact of these famines, the longer duration of that of 1650–1652 should be kept in mind. Thus in the east of France the famine of 1650–1652 produced total excess mortality more than double the annual norm, three times that of the “accession crisis,” and more than twice that of 1693/94. Aggregate excess mortality for France as a whole is estimated by applying Lachiver's regional 1685 estimates as weights, and assuming that the population of France c. 1650–1660 was 19.5 million.⁶³ By this reckoning, taking the hexagon as a whole, the famine of 1693/94 was the worst of the three, though not shading that of 1650–1652 by much. Considering all three famines together, the regions most at risk were the Center and Seine/Loire regions (as defined by Lachiver).

APPENDIX TABLE 1
ANNUAL EXCESS MORTALITY, BY REGION
(percentage above norm)

	1650–1652 (3 yrs.)	1661/62 (2 yrs.)	1693/94 (2 yrs.)	Population 1685 (1,000s)
East	68.2	31.7	45.7	3,718
North	58.5	84.8	87.9	3,274
Center	59.0	85.7	96.7	2,577
Southeast	40.9	–14.2	59.5	1,965
Southwest	39.8	52.8	176.3	3,443
West	29.6	67.5	23.1	4,837
Seine–Loire	90.3	133.4	105.2	2,207
France (famine period)	158	126	161	22,021
Implied excess mortality (millions)	1.1	0.9	1.2	

Note: The rates are calculated against averages for 1640–1648, 1656–1658, and 1680–1692.

⁶² Ó Gráda and Chevet, “Market Segmentation,” appendix.

⁶³ Dupâquier, *Histoire*, p. 60.

APPENDIX TABLE 2
SALES OF WHEAT AT CHOISY-AUX-BOEUFS IN THE 1690s
(percentages)

Month	VIII	IX	X	XI	XII	I	II	III	IV	V	VI	VII
Normal years	1.8	1.9	1.4	6.4	8.4	8.8	11.6	11.1	8.7	11.9	17.4	10.6
1693/94	11.4	12.3	8.0	8.8	6.0	12.6	8.5	8.8	7.3	7.1	9.2	0.0

Source: Moriceau and Postel-Vinay, *Ferme, entreprise, famille*, p. 226.

Appendix 2: Seasonality and Storage

As noted in the introduction, Adam Smith believed that grain merchants were best placed “to divide the inconveniencies of [a scarcity] as equally as possible through all the different months, and weeks, and days of the year.”⁶⁴ The historical evidence on whether they did so is scarce, and certainly too little to generalize on. The recent study of the changing fortunes of the Chartier farming dynasty by Jean-Marc Moriceau and Gilles Postel-Vinay offers a tantalizing glimpse at the actions of one major player in France in the 1690s. The Chartier farm, of about 500 acres located at Choisy (about 30 km north of Paris), specialized in producing grain. Appendix Table 2 compares monthly off-farm sales in normal harvest years with sales in 1693/94. It shows that the Chartiers disposed of *more* of their corn in the early months of that famine harvest-year than in normal seasons.

What of price data? In a much-cited study published in 1984, McCloskey and J. Nash sought to infer storage costs and interest rates in medieval and early modern Europe from the seasonality patterns observed in grain prices. Their argument was built on the simple premise that those merchants and farmers who store grain must in equilibrium be rewarded for the opportunity cost of tied-up funds and for losses from wastage during the storage period. A saw-tooth price seasonality pattern is indicated, with low prices in the wake of the harvest giving way gradually to a maximum before the new harvest comes in.⁶⁵ The more important are fixed costs such as storage facilities and security, the less sensitive will seasonal increases be to the quality of the harvest. Abstracting from other complications, this means that in a well-functioning market seasonality would at most produce the same proportionate price increases in bad years as in good.

In reality this presumption is complicated by the presence of carryover stocks of grain from one harvest to the next, and in practice there is considerable variation or “noise” in the month-to-month and seasonal movements.⁶⁶ Nevertheless, an analysis of the role of markets in the Great Irish Famine of the 1840s has found that prices of different potato varieties before the crisis were subject to marked seasonality, and has exploited that regularity to argue that strong deviations from the established pattern might be interpreted as evidence of either hoarding or panic selling. If, on the one hand, the seasonal rise in prices during the crisis were less than normal, this might indicate that producers were holding on to stocks in hopes of much higher prices at the end of the season. If, on the other hand, potato prices rose much faster than usual early in the season, this could reflect either the fears of producers that their stocks of potatoes might succumb to the potato blight or the desperation of consumers. Hoarding during famines, then, implies smaller increases than usual from seasonal trough to peak.⁶⁷

⁶⁴ Smith, *Inquiry*, pp. 533–34.

⁶⁵ McCloskey and Nash, “Corn at Interest.”

⁶⁶ See e.g. Persson, *Grain Markets*, pp. 68–70.

⁶⁷ Ó Gráda, *Ireland*, pp. 116–21.

APPENDIX TABLE 3
THE SEASONAL RISE IN WHEAT PRICES, 1676–1720: QUARTERLY DATA

	Paris	Pontoise ^a	Rozay	Toulouse	Winchester
Mean increase (%)	2.3	4.4	2.7	9.0	11.8
Standard deviation	41.6	44.0	46.8	29.9	40.1
Increase 1692/93 (%)	61.3	68.7	51.1	14.1	30.9
Increase 1693/94 (%)	79.2	68.4	51.5	79.2	51.5
Increase 1708/09 (%)	112.0	188.9	134.2	112.0	134.2

^a1686–1720 only.

Sources: See the text.

Potatoes, being nonstorable, are an ideal crop for this kind of simple framework. Grain prices are bound to produce “noisier” results. In Appendix Table 3 below we compare the average rises in wheat prices between the third quarter of year t (at the beginning of the harvest year) and the second quarter of year $t+1$ (before prices are affected by the next harvest) in Toulouse, Paris, Pontoise, Rozay-en-Brie, and Winchester between 1676 and 1720. The results show only weak traces of the seasonality pattern noted by McCloskey and Nash. On average prices rose a little between the quarters, but they were subject to huge year-on-year variation. However, in the famine years 1693/94 and 1708/09 the rises greatly exceeded the average, in 1708/09 soaring two or more standard deviations above it. Monthly data for 1680–1719 for a similar range of markets produce a similar picture (Appendix Table 4): a small average increase over the months between September and June and much year-to-year variation in that increase. The particularly sharp seasonal price rises during our two famines do not rule out the possibility that farmers or others hoarded early in the season in hopes that price would rise later, but surely they make it less likely.

APPENDIX TABLE 4
THE SEASONAL RISE IN WHEAT PRICES, 1680–1719: MONTHLY DATA

	Paris ^a	Angoulême	Rozay	Toulouse	Montbatzon ^b	Pontoise	Grenade
Mean increase (%)	0.9	10.8	2.4	7.3	13.7	7.6	12.2
Standard deviation	28.1	35.9	49.0	28.8	49.2	47.4	31.1
Increase 1692/93 (%)	80.4	27.0	44.7	37.0	22.5	84.6	39.1
Increase 1693/94 (%)	21.5	29.8	40.4	53.1	50.0	40	61.8
Increase 1708/09 (%)	–	171.8	256.5	108.9	248.1	242.7	112.5

^a1680–1698.

^b1680–1715 and 1698/99 missing.

Sources: See the text.

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