

Agriculture and long-run growth

In 1700, all economies were based very largely on agricultural production. The agricultural sector employed most of the workforce, consumed most of the capital inputs and provided most of the outputs in the economy. In some ways this is obvious. People in 1700 were much poorer than they are today but required similar levels of food intake, so food must have constituted a higher percentage of economic activity – whether measured from the production, consumption or expenditure sides of the national income identity. Hence at the onset of the Industrial Revolution in England, around 1770, food accounted for approximately 60 per cent of the household budget, compared to just 10 per cent in 2001 (Feinstein, 2000; British Government, 2002). But it is important to realise that agriculture additionally provided most of the raw materials for industrial production: fibres for cloth; animal skins for leather; wood for building houses and ships and making the charcoal used in metal smelting. There was scarcely an economic activity that was not ultimately dependent on agricultural production - even down to the quill pens and ink used by clerks in the service industries. In 1700, agriculture accounted for probably 80 percent of GDP in virtually all European economies, and this situation probably continued up to the mid-nineteenth century in many of them.

The very large share of agriculture in economic activity has several important economic implications. First, the growth rates of agricultural output and productivity within each country were the primary determinants of overall growth rates in each country. Similarly, agricultural productivity differentials across countries were the primary determinants of overall productivity differentials across countries. Second, Crafts (1985) has emphasized that substantial food imports were unavailable to any country in the eighteenth century because no other country was producing a sufficient agricultural surplus to be able to supply the food demanded. Therefore any transfer of labour resources from agriculture to industry required high output per worker in domestic agriculture because each agricultural worker had to produce enough to feed both himself and some fraction of an industrial worker. This is crucial because the transfer of labour resources out of agriculture and into industry has come to be seen as the defining feature of early industrialization. Alternative paradigms of industrial revolution – such as significant increases in the rate of productivity growth, or a

marked superiority of industrial productivity over that of agriculture – have not been supported by the empirical evidence.

Measuring the importance of the agricultural sector in each economy in 1700, and tracing its evolution over time, is impossible with any degree of precision. The standard modern approach would be to calculate for each year the share of agriculture in GDP in each country. By contrast, the best that we can do is estimate the percentage of the workforce employed in agriculture for a selection of countries at benchmark dates. Nonetheless, this proves to be quite a useful statistic if we follow the Crafts definition of industrialization. Brunt and Fidalgo (2007) recently re-examined the available data on the European agricultural workforce and we report their findings in table 1.

Table 1. The percentage of the European workforce employed in agriculture.

	1705	1775	1845	1870
Austria		75	72	64
Belgium			26	17
Denmark				45
England	35	29	20	14
France	70	65	59	59
Ionia			68	60
Ireland	48	48	75	49
Malta			50	50
Netherlands		38	34	35
Norway			33	33
Poland			89	58
Prussia	80	70	60	49
Russia			81	81
Scotland		50	23	17
Spain	71	66	61	61
Sweden				80
Wales				53

We can see that the relative importance of agriculture declined earliest and fastest in England, Scotland and Belgium, with the Netherlands being some way behind. Norway was also low, but this is almost certainly due to the extraordinary importance of fishing in GDP rather than a sign of early industrialization. Most other European economies remained predominantly agricultural through to 1870.

Measuring agricultural productivity in this period is very difficult owing to the severe data constraints. The data on labour and land inputs are poor; but the data on capital inputs are non-existent, which precludes any attempt to estimate total factor

productivity. The data on arable agriculture are considerably better than the data on pastoral agriculture. This is partly because arable agriculture is immobile and tends to be taxed, whereas pastoral agriculture can be highly mobile and is therefore seldom or ineffectually taxed. But, also, there is a clear distinction in arable agriculture between inputs (such as seed and fertiliser) and outputs (such as grain and straw). By contrast, in pastoral agriculture an animal can be either an input (such as a breeding cow that gives milk and calves) or an output (such as a cow that is sent to the slaughter house for meat and leather); tax and census data on animals almost never distinguish between these different possibilities. In the light of these problems, Brunt and Fidalgo (2007) recently produced new estimates of labour productivity in arable agriculture only. They employed the same estimation procedures as those used in the International Price Comparison project and the Penn World Tables. Although these estimates are only partial (rather than total factor) productivities, this is quite informative given the primary role of labour productivity in facilitating industrialization. Their results are reported in table 2 below.

Table 2. European agricultural labour productivity (England=100 in 1870).

	1705	1775	1845	1870
Austria		30	18	25
Belgium			60	112
Denmark				57
England	59	84	71	100
France	22	15	19	27
Ionia			1	2
Ireland	9	146	46	58
Malta			12	24
Netherlands		45	48	36
Norway				21
Poland			9	53
Prussia	1	2	23	51
Russia				
Scotland		57	109	157
Spain			5	
Sweden				16
Wales				35

We can see that England, Scotland and Belgium were far more productive than other countries. This fits broadly with the traditional historiography. The surprising aspect of the new data is the magnitude of the lead of England and Scotland, which is probably underestimated here owing to the exclusion of pastoral

agriculture (in which England and Scotland were relatively heavily engaged compared to other countries). By 1870 the relative performance of Denmark, Ireland, Poland and Prussia had become fairly respectable, that of the Netherlands and Wales rather less so and that of all other countries still very poor. Can the variation in performance really have been so large? It is interesting to compare 1870 to 1970, when one would suppose that the spread of technical information and market pressure would have narrowed the gap in labour productivity. This is reported in table 3 below, where we take Britain as our base in order to maintain comparability with the 1970 data (Rao, 1993, table 5.9). Compared to Britain, levels of labour productivity across Europe were slightly higher in 1970 than in 1870 (averaging 58 rather than 50) but dispersion was also slightly higher (the coefficient of variation being 38 rather than 33).

Table 3. European labour productivity in 1870 and 1970 (Britain=100 at each date).

	1870	1970
Austria	25	37
Belgium	114	115
Britain	100	100
Denmark	58	80
France	28	55
Ionia	2	17
Ireland	59	47
Netherlands	37	113
Norway	22	29
Poland	54	12
Prussia	52	34

There are a number of well known and important difficulties in using labour productivity as an indicator. One problem is that we are measuring annual labour productivity as total output divided by all workers, rather than productivity per hour worked, and there could be systematic differences across countries in workforce utilization. For example, agricultural labour in traditional societies often had several sources of employment and these could include alternative sectors such as services (especially transport), construction, mining or industry. Also, workers could be seasonally unemployed; their earnings might be enough to keep them living in the countryside year-round but there was not enough work to keep them occupied in the slack periods. This distinction was perhaps less important in a country such as England, where in 1700 the agricultural workforce consisted of family labour supplemented by young adults hired on annual contracts (Allen, 1994, p.106);. But it

was important on the large Italian and Spanish *latifundios*, where the highly seasonal demand for labour led to temporary contracts and farm employment for the landless was perhaps half that of those in northern Europe. The problem for much of southern and eastern Europe was the lack of year-round employment opportunities in agriculture.

However, if we take the above estimates as broadly representative then we need to consider just why labour productivity and rural living standards differed so markedly across Europe. This requires us to explain both why productivity and farmers' living standards failed to rise over much of eastern and southern Europe, and why labour productivity surged ahead in some areas of northwest Europe. Section two looks at technological change and population growth, section three examines urban markets and specialisation, and section four addresses institutional factors. We conclude with some general comments on the contribution of the agricultural sector to industrialisation.

Technological change and the growth of productivity and population.

The significant increase in Europe's population over the period 1700 to 1870, as described in chapter 2, required farmers to increase food output if living standards were not to decline. Much of the European continent had long been settled, hence changes in the size of the population equate largely to changes in the density of population, rather than expansion at the geographical frontier as in North America or Australia. Much, though not all, of the increase in output between 1700 and 1870 is attributable to an increase in the intensity of rotations and the switch to new crops. In exceptional cases this could involve the planting and production of a high value crop, such as grapes in the Médoc, but usually it involved much humbler ones such as the potato, which was high in calories and value.

The Malthusian model of population notes that rising population makes land increasingly (relatively) scarce. We would expect this to prompt the adoption of land-saving techniques and result in a reduction in output per worker, since each worker has less land to cultivate. At first glance, the European evidence is consistent with this interpretation. For example, land was in limited supply in the Netherlands. Therefore, as the economy and population boomed in the seventeenth century, as a result of the Dutch monopoly of the spice trade to Asia, it made sense to respond by both creating new land and intensifying production on existing land to meet the urban demand for

food. This prompted both the reclamation of land from the sea using dykes and the application of much more fertilizer to each unit of land. A comparable change in England in the eighteenth century was the replacement of fallow land by crops such as turnips and clover, thus making more intensive use of land resources and effectively increasing the area of cultivated land per worker. This technique reached its apogee in England in the mid-nineteenth century with the widespread adoption of the 'Norfolk four-course' crop rotation, in which wheat cultivation in one year was followed by turnips in the next year, barley in the next and clover in the next. This system was adopted in the nineteenth century in modified form in other northern European countries. In the English system the turnips and clover were fed to animals, which raised meat output for the voracious English market. In France and parts of Germanophone Central Europe the turnips were substituted with sugar beet; this made sense because the farmers faced a lower demand for meat (since incomes were lower and meat is an income-elastic good) and sugar was more expensive (since France and Germany did not have tropical colonies where they could produce cheap cane sugar). Attempts were made in the Mediterranean to introduce the new rotations of northern Europe, but they usually failed due to the very different farming and market conditions found there.

Yet southern farmers were not necessarily disadvantaged in the same way as their northern counterparts when it came to rising population pressure. One of the problems of southern Europe was the periodic unemployment that occurred through the year and intensification of production could help to solve this problem. First, in some areas the land, which had once provided only poor quality natural grazing, was ploughed up and cereals sown instead. Second, cereal rotations, which had provided just a single harvest every three or more years, were shortened so that crops were taken more frequently. Finally, the area under crops such as vines and olives increased. While a hectare of cereals in southern Spain in the 1880s provided only about 20 days employment per year (less if fallow is taken into consideration), the vine required 80 days and the olive 30 days (Simpson, 1992, tables 2 and 7). Contemporaries in Spain at this time considered that their natural resource endowment was favourable, and cereal producers in the 1850s and wine-growers in

the 1870s looked to become major exporters. Their hopes were ruined only as the integration of global food markets led to New World countries capturing these export markets, and then threatening Spain's domestic markets itself. It was similar elsewhere in the Mediterranean. Tariffs were significantly increased on cereals in Spain in 1891, just as they were in France (1885-94), Italy (1887-94), and Portugal (1889-99). Spanish contemporaries came to reflect bitterly on what were then perceived as their country's poor natural resource endowments. In effect, the integration of the North Atlantic grain and livestock economy had shifted the comparative advantage of large areas of Mediterranean from being a land-intensive agriculture to a capital-intensive one. The difficulties for farmers to adapt to this change were considerable, and the final stage in the process of crop intensification only came with modern irrigation, which required both the construction of large-scale reservoirs to store the water (as oppose to simply using free flowing rivers and streams), and the development of biotechnologies to create new specialist crops to sell in national and international markets. Certainly there were some signs of change in the Mediterranean as early as 1870, but the process only acquired any real importance from the mid twentieth century.

In eastern Europe, too, especially in the areas still dominated by serfdom, the introduction of new agricultural technologies occurred more slowly and unevenly than in the northwest. There were some entrepreneurial landlords, who introduced new rotations and crops on their demesne lands. For example, in the mid-eighteenth century the Kleist family initiated a move from the traditional three-field grain system to a system of fallow-free convertible farming, which resulted in a substantial increase in output (Hagen, 2002, p. 314-15). Further east, demand grew among more enterprising Russian landlords for English books on agricultural improvements.⁴ There were even instances of Russian peasants themselves introducing modifications such as new fertilizers and non-grain crops on their own allotments (Moon, p. 130-

⁴ Konstantin Levin, the enthusiastic reformer in Tolstoy's *Anna Karenina*, was modelled on such a landlord. It is worth noting that in the end Levin abandons his reforms, having decided that English innovations were impossible in a Russian context.

31). On the whole, however, the three-field system of grain cultivation (mainly wheat, rye, and oats) remained in place throughout eastern Europe until well into the nineteenth century (in much of Russia it remained in place even after the abolition of serfdom in 1861). This was to some extent due to the different ecological conditions in this region (shorter growing seasons, different soils) and, in the case of the Russian empire, to an abundance of land, which reduced the pressure to intensify production. But even more important were the institutional constraints imposed by serfdom and strong rural communities, about which more will be said in section four.

One example of crop intensification which achieved widespread success was the potato. Although it had been known since the sixteenth century, when it had been brought by the Spanish from its native habitat in the Peruvian and Bolivian Andes, it was rarely grown in Europe before the late eighteenth century. Then a combination of growing population pressure, grain shortages and famine, together with the development of new seed varieties, encouraged its spread: in the early 1770s in parts of Switzerland, Germany and Austria; in the 1790s in France, and the 1810s in Hungary and Poland (Blum, 1978, pp.271-6). While France had about 20 000 hectares planted on the eve of the Revolution, the figures had risen to 3 million by the first decade of the nineteenth century. The potato provided many more calories per hectare than wheat or rye (but not necessarily in terms of hours worked), and allowed many small farmers to subsist, freeing them to use the rest of their land and labour to grow cash crops. Yet there were limits on an agricultural system excessively dependent on the potato, as it was both difficult to store and transport, which made it difficult for growers to accumulate savings as an insurance against crop failure (Hoffman and Mokyr, 1984 and Mokyr, 1985).

The only way to allow the population to grow and to improve simultaneously labour productivity and living standards was to change technology. Boserup (1964) argued that technological change occurs as a direct result of population pressure, as it is the increasing difficulty of meeting the current standard of living that spurs people to innovate. One could argue that the development of European agriculture fits this characterization, especially the increasing population pressure in the northwest and the response of increasing capitalization and the introduction of new crops to use land

resources more intensively. But there are two caveats to this straightforward and attractive line of reasoning.

First, it is usual to draw a distinction between 'technological change' and the 'choice of technique'. The former is a dynamic concept: new technology is created in response to high or rising input prices. The latter is a static concept: farmers are already aware of a range of possible production techniques and they choose the least-cost method of production given the prices that they face. Many of the fertilization techniques (such as liming and marling) that came into fashion in the eighteenth century in England and the Netherlands had been known for many years (even in Roman times) and farmers had merely chosen to reintroduce them because relative prices had shifted in such a way as to make it profitable once again. The same may also be true of some aspects of crop rotation, such as the increasing use of clover in England. In that sense, that changes that we see were simply a change in the choice of technique rather than technological change.

Second, England had one of the highest land-labour ratios in the world and should really have been inventing labour-saving technologies, if it were responding to resource constraints in the way that Boserup suggested. But the evidence on this is very mixed. For example, attempts to introduce steam threshers in the 1820s sparked the Swing Riots and the machines vanished in southern Britain until the 1850s (Hobsbawn, 198 and Mokyr, 2005). Also Brunt (2003) has showed that innovation in English plough technology was driven by local knowledge spillovers rather than local resource shortages (as signalled in the market place by the local relative prices of labour and capital). However, England did manage to introduce some labour-saving machinery at a relatively early date. Notably, by 1871 an estimated 25 per cent of wheat in England and Wales was harvested by reapers, considerably more than in Germany (3.6 per cent in 1882) or France (6.9 per cent in 1882) (Collins, 1969). Some Mediterranean farmers also tested the new labour saving equipment but rejected in preference for the cheaper, traditional methods (Reis, 1992, Simpson, 1995 and Federico, 2003).

It may be that a deeper understanding of technological change requires a more holistic view of agricultural production. Labour productivity in agriculture was greatly influenced by the ratio of draught animals to human labour. O'Brien and

⁷ Wrigley (1991, p.329) calculates that French farm workers had about 2.1 'man-hours' of horse labour to assist him for each hour worked, compared to a figure of 3.5 hours for the English workers.

Keyder (1978, pp.115-9) have suggested that English farmers had perhaps two thirds more animal power than their French counterparts in 1800, helping to explain the differences in labour productivity.⁷ The role of horsepower was crucial to increasing output both on and off the farm and this was one of the areas where the Mediterranean region, for example, appears to have been at a major disadvantage compared to northern Europe. While the technological barrier to increasing the number of farm animals in northern Europe was the lack of winter fodder, which was overcome with the planting of crops such as turnips, in southern Europe the seasonal shortages of feed occurred during the summer months. South of Poitou in France the possibilities of growing spring cereals were limited, cereal yields were perhaps only as much as a third of those in the north, and the long dry summers produced poor quality grass. Irrigation was an expensive solution, and this energy restriction remained in the Mediterranean region until the massive introduction of tractors in the second half of the twentieth century.

Urbanisation, markets and farm specialisation (1700)

Adam Smith (1970 ed, p.515) wrote that ‘through the greater part of Europe the commerce and manufactures of cities, instead of being the effect, have been the cause and occasion of the improvement and cultivation of the country’. The concentration in cities of consumers with high incomes gave farmers a major incentive to specialise in commodities whose income elasticities of demand were higher than that of cereals. Economic historians such as Jack Fisher or Tony Wrigley in particular emphasised the role played by London. Outside England and the Netherlands (with its urbanisation rate of 30 per cent) the pull of the urban market was much weaker for most farmers. In 1850, on the eve of the railway age, levels of urbanisation were 15 per cent in France, 11 per cent in Germany, 17 per cent in Spain, 20 per cent in Italy, and just 8 per cent in Austria-Bohemia and 9 per cent in Poland (de Vries, 1984, Table 3.8).

A high degree of urbanisation might encourage farmers to specialise, but it was the efficiency by which food could be brought from the countryside to the city which would play a major factor in determining the size of the city in the first place. Therefore if Smith (1970 ed., p.177) could write in the 1770s that the price of bread and butchers meat were generally the same, or very roughly the same throughout the

greater part of the United Kingdom, this was hardly the case in some parts of Europe even a century later.

Two types of obstacles to domestic trade can be identified. First, there was the physical cost of transportation. Second, there were institutional impediments such as taxes or the need for official transport permits, or outright prohibition of the movements of goods and (in the case of eastern Europe) people. These two features were not entirely separate. In England communications were good due to the abundance of settlements located close to navigable water, the relatively small distances, and the good flow of market information. The risk of famine was also low. On the one hand, government policy encouraged farmers to continue planting even at times of abundance, since there were effectively guaranteed minimum prices to farmers because bounties were paid on exports in times of low domestic prices. On the other hand, in times of unexpectedly small harvests (due, for example, to several consecutive seasons of bad weather), the workers' relatively high incomes attracted imports to make up the shortfall.

The English case can be contrasted with the situation in much of continental Europe. Grain marketing there was very heavily controlled, especially in the eighteenth century, with only certain places being permitted to hold grain markets and farmers being obliged to market any surplus grain through those markets; selling outside the market was illegal and subject to very harsh legal sanctions (Persson, 1999). Transport was costly and information on the size of harvests and stocks was limited or non-existent for consumers. Rumours of shortages could set off panic buying in towns and this encouraged merchants to move grain from the countryside, where consumers had limited savings, for resale urban markets. Yet *ancien régime* governments used a whole battery of measures to protect further urban consumers: maximum prices, restrictions on grain movements, government granaries, etc. The urban policy bias could discourage grain planting, especially after poor harvests when regulated maximum prices effectively expropriated the profits of farmers. Farmers might try to increase their profits by switching to other crops such as the vine but often found that they were prohibited from doing so.⁸ Another obstacle for much of continental Europe was that goods transported and introduced into urban areas were taxed, a feature that continued well into the twentieth century in some countries.

⁸ López y Peñalver (1812) for under-cultivation at times of low cereal prices, and Dion (1977), for the restrictions on planting vines in France.

The most famous famine of the period 1700 to 1870 is, of course, the Irish famine. O'Grada (1988, p.109) argues that Ireland switched from being a substantial exporter to net importer of grain during the Famine years, and that there was simply not enough calories to feed everyone after the failure of the potato harvest due to plant disease.⁹ However, the Irish famine was clearly exceptional. Research on developing economies shows that famines are not necessarily caused by an overall lack of food in the economy; instead they are caused by a maldistribution of food, either because some social classes cannot afford the food that they need or because the food cannot be shipped to the place where it is most needed (Sen, 1981). The same was true of Europe in the period from 1700 to 1870 and the structure of local food markets profoundly affected how well the agricultural sector met the demands placed upon it by the wider economy.

Despite the physical and legal constraints that they faced, grain merchants did their best to trade with one another when price differences were sufficient to overcome the institutional and transport costs. But how big were these inter-city price differences and how did they change over time in response to increasing political stability and improved communication networks? These price differences provide one metric of the degree of market integration. A second metric is that of the speed of adjustment. How long does it take merchants in London to respond to a price spike in Paris by arbitraging the two market prices back down to the level of the transport cost between the two cities? Consumers and producers will both be better off, on average, if the speed of adjustment is faster.

Jacks (2005) examined grain price series for 100 cities in Europe and North America between 1800 and 1913. He found that markets in northwestern Europe - such as England and Belgium - were generally already well integrated by 1800, both within countries and between countries. Price differences were low and adjustment speeds were high. Moving further south and east in Europe was associated with generally lower levels of market integration on both measures, with Austria-Hungary and Spain performing particularly badly. Jacks found considerable evidence of falling price differentials up to 1870 for all countries, but no improvement in adjustment speeds. Regression analysis of both price differentials and adjustment speeds revealed the type of economic behaviour that we would expect to find: better transport links

⁹ See also Mokyr (1983).

(canals, railways, ports and river connections) resulted in smaller price differentials and higher adjustment speeds. However, it is interesting to note that Jacks (2006) shows that improvements in market integration over time were not due to improvements in transport networks; instead they were due to improved political stability. Whilst Jacks' results are certainly interesting, Coleman (1995) argues that tests of market integration based on prices alone may be misleading because it is difficult to distinguish between increased synchronicity of shocks and increased speed of adjustment. Brunt and Cannon (2007) address this problem by breaking down price differentials into four components: the average price differential, the variance of the price shocks, the correlation between the shocks to the two price series, and the speed of adjustment of one series to the other. They find that for England between 1770 and 1820 virtually all of the deviation from the "law of one price" was due to the average price differential, rather than the adjustment speed; like Jacks, they find that the marked improvement in roads and canals over the period had very little effect.

For some regions, export markets were of particular importance. By the late eighteenth century the major trade flows in basic foodstuffs, such as grain, were from the Baltic (especially East Prussia and Poland) towards northwest Europe (especially the Netherlands, which was both a consuming centre and a distribution hub). From the early nineteenth century onwards, England became the major European importer and began to draw grain additionally from Russia through the Black Sea (Fairlie, 1965). The total quantities shipped were nonetheless quite small compared to overall consumption; even in England in the 1850s, after the move to free trade, wheat imports amounted to only around 25 per cent of total consumption. There was very little impact from trade with the New World before 1870 (O'Rourke, 1997; O'Rourke and Williamson, 1999).

Wine had been an important commodity in international trade in earlier periods, but between the mid-seventeenth and the late eighteenth centuries the production of specialised fine wines underwent major changes that changed the patterns of trade and consumption. Port was a drink developed by British merchants in Portugal for consumption in Britain (Bradford, 1969, p.43). The development of fine wines in the Bordeaux region can be dated to the period between about 1650 and 1740, involving the draining of the Médoc and the introduction of cylindrical bottles and corks that allowed the best wines to be matured in bottles (Pijassou, 1980). Finally, producers in Champagne learnt to overcome the difficulties of a second

fermentation in the bottle and began to market their wine as a luxury product worldwide (Guy, 2003, Simpson, in preparation). The poor keeping-quality of most wines, high transaction costs and high levels of taxation everywhere limited the possibility for European farmers to utilise labour more intensely and obtain productivity gains through market specialisation in wine. Nevertheless, wines were very important export items, accounting for about half of all Portuguese's exports in 1850, a quarter of Spanish, and a tenth of French.¹⁰

Institutions

The empirical findings described in the previous sections indicate significant variation in labour productivity, technological progress, and market integration across Europe in this period. Still, a broad pattern can be discerned: southern and eastern Europe lagged behind the northwestern regions – especially England and the Netherlands – in all these areas until well into the nineteenth century. How can we account for these differences?

A number of theories has been put forward over the years. One of these emphasizes the role of climate and geography.¹¹ In this view, the climate and geography were more suitable for agriculture in the northwest than in other parts of Europe. Long, harsh winters in the east meant an extremely short growing season, while hot summers in the south made crops vulnerable to drought. England and the Netherlands are thought to have been especially fortunate in their access to waterways, which enabled a degree of market integration that the rest of Europe achieved only after the invention of the railroad. Without access to markets for output, it is argued, peasants in the south and east were unwilling to invest in agricultural improvements. These issues were undoubtedly important, but the theory is not entirely convincing. First, climate and geography were not uniform across the south and east – especially not across a territory so large as the Russian empire – yet agricultural productivity there consistently lagged behind western Europe. Moreover, there were other parts of the world, such as North America, that did manage to

¹⁰ Port wine and maderia represented 38 per cent and 7 per cent respectively of all of Portugal's exports in the 1850s, while sherry accounted for 20 per cent of Spain's exports between 1850/4. Prados de la Escosura (1982, p.41) and Lains (1992, p.126). France??

¹¹ See, for instance, the argument in Sachs, *The end of poverty*; Milov, in *Velikorusskii pakhar*, applies this argument to the history of Russia.

overcome harsh climates and similar geographical constraints. Thus geographical factors alone probably cannot account for the variation we observe across Europe.

A second theory attributes differences in productivity to cultural differences. This view sees northwestern Europe as more individualistic and thus more ‘capitalistic’ than that in the rest of Europe.¹² Some versions of this theory place the emphasis on religious differences, viewing ‘Protestant’ values as more compatible with economic development than those associated with Catholicism, Greek or Russian Orthodoxy, or Islam. Others emphasise differences in mentalities between the inhabitants of highly urbanised societies such as England, the Netherlands, or northern Germany and people in the rural south and east, who were mostly peasants. In this view, the more “capitalistic” farmers in northwestern Europe treated agriculture as an enterprise and sold their produce on the market, whereas those in peasant societies grew food mainly for household consumption.¹³ Or, in other words, those in northwest Europe sought to maximise profits, while the peasants of southern and eastern Europe aimed mainly to minimise risk and ensure self-sufficiency. But the cultural characteristics emphasised in this view do not generally coincide with cultural boundaries in the ordinary sense. In other words, there was as much variation within any given cultural zone as between cultures. Peasants in some parts of Russia, for instance, behaved much more like capitalistic farmers than those in other parts, though they all shared a similar cultural background.

A more promising view focuses on the role of institutions, especially the procedures established to uphold property rights and enforce contracts. This approach tries to explain differences in productivity as resulting from differences in the economic, social or legal frameworks that characterise a particular society. For instance, without secure property rights, farmers – regardless of religious beliefs or length of growing season – were unlikely to invest in agricultural innovations, since they could not be sure that the returns to such investments would accrue to them. Without a reliable system of contract enforcement, peasant farmers could not obtain credit, and thus could not undertake expensive innovations. Property rights and contract enforcement varied substantially across Europe in this period. How these

¹² One of the best known formulations of this view is MacFarlane, *English individualism*; Procaccia in *Russian Culture* maintains that western Europe was “individualistic” while the east – in particular Russia – was “communitarian”.

¹³ This view is often associated with the nineteenth-century Russian agronomist A. Chayanov. Examples can be found in the “peasant studies” literature: for instance, Scott, *Moral economy*; Shanin, *Peasants*

processes worked in any given place was largely determined by the local institutional framework – in particular, by the strength of local corporate entities, such as landlords, churches, and communities.¹⁴

In England, these groups were relatively weak. Instead there was a remarkably centralized legal framework and system of courts, which developed at a very early date. Even in the medieval period, when churches and landlords were quite powerful and had much control over their peasant tenants (serfs), an integrated system of courts was used – even by serfs – for the resolution of property and credit disputes. Not only were there manorial courts, where disputes regarding transactions among serfs were heard, there were also royal courts, to which serfs could bring cases against their own landlords. If they felt, for instance, that their landlords were violating customary agreements by raising rents or demanding additional labour. This legal framework was not nearly as sophisticated as that which exists today but it nonetheless sufficiently reduced the risk involved in transactions to enable the existence of lively rural markets in land and credit.¹⁵

It was this legal infrastructure that made the innovations in agriculture described in section two possible. [Liam to add a bit here about role of property rights and contract enforcement in the enclosure movement and later technological innovations]

In much of southern Europe, property rights were less clearly defined, and improvements in agriculture were hindered by disputes among powerful local groups over control of resources. Rosenthal (1992) has argued that, due to uncertainty in property rights in *ancien régime* France, landlords and villagers could often claim rights to the same lands. While France did have a system of courts to decide such questions, this system did not function particularly well. The litigation process was slow and costly and decisions that were granted could be appealed repeatedly. This

¹⁴ In what follows, we focus on broad differences across regions. The effects of local institutions across “France” or “Spain” (let alone “central” or “eastern” Europe) were far from uniform, but a detailed discussion of that variation is beyond the scope of this section.

¹⁵ Even within “centralized” England there was institutional variation. Recent research on rural debt litigation in the thirteenth and fourteenth centuries suggests that manorial court procedures – and the way courts were perceived to function by local inhabitants – had a significant effect on the size and shape of local credit markets. See Briggs, “Manor court procedures”.

¹⁹ “Second” because it came after medieval serfdom or “feudalism”, though it is worth noting that not all places which experienced a “second” serfdom had experienced a “first”.

did little to reduce uncertainty and innovation remained a risky undertaking. The situation only improved, with greater investment in technological innovation, when a uniform system of clearly assigned property rights was introduced by the Revolution.

Spanish agriculture, too, was affected by uncertainty in property rights. “Ownership” in Spain often had several layers, with those who had rights to the rents from land being distinguished from those who had the right to cultivate it (*dominium directum* and *dominium utile*) (Simpson, 1995). Agricultural innovations were further hindered by powerful local groups, who held special privileges from the Crown. Such decisions were also influenced by the Mesta, a powerful association of shepherds and sheep owners, which the Crown, in exchange for payment, had bestowed with rights to pasture on all traditionally unsown land. This arrangement made it impossible in many places to enclose property or bring pasture under cultivation, thus limiting the possibilities for increasing production.

Powerful local interests influenced agricultural innovation in central and eastern Europe as well. In this region landlords and communities were strong and the central state was weak. Much of Europe east of the river Elbe experienced in this period what is often referred to as the “second serfdom”.¹⁹ Serfdom was a tenurial system in which landlords had significant control over the allocation of their tenants’ labour. Serfs are often said to have been “tied to the land” because, in most serf societies, they were not free to leave their landlords’ holdings. They cultivated land which they rented from their lords and for which they usually paid an annual fee in cash or kind. In addition, many serfs were obliged to spend several days per week cultivating the landlord’s own land (demesne). This in itself undermined any attempt to increase productivity: serfs were unable to allocate their full supply of labour to their own plots, as they were forced to give several days’ labour to their landlord. And they had no incentive to use their labour efficiently on the demesne, as the benefits of their exertion accrued mainly to the landlord.

Landlords under the “second serfdom” engaged in various forms of rent-seeking. Some held monopolies on brewing and insisted their tenants buy local beer at inflated prices. Many held monopolies on milling and insisted their tenants bring grain to the manorial mill. Most landlords extracted fees from their tenants for

permission to marry or to travel beyond the estate boundaries.²⁰ And landlords in some places – such as the Russian Empire – were free to raise taxes and introduce new fees and obligations at any time; they were not constrained by the kinds of customary arrangements that existed in medieval England. This steady confiscation of surpluses made it very difficult for peasant farmers to accumulate the wealth necessary to invest in improving their yields. It also simultaneously provided a disincentive for such investments, since the returns were anyway likely to be siphoned off by landlords.

Incentives for productive innovation in this region were further undermined by strong local communities. In European Russia, for instance, arable land was held in communal tenure and allocated to member households in accordance with the number of labourers and consumers in each. When a household changed in composition, some portion of its land could be reallocated to another family. Allotments could not be sold or mortgaged without the permission of the entire community. While communal land tenure was rare outside Russia, many village communities in central Europe controlled access to land through their power to regulate transfers; serfs could not sell or bequeath holdings without the permission of the community, as well as the landlord.²¹ Similarly, communities had the power to take land away from households they viewed as not economically viable. In some places, widows could be forced by the community to remarry in order to retain their holdings.²² Finally, many village communities in this region had the power to decide how land was used. Those who wished to plant new crops or adopt new technologies had to have the permission of the community.

Restrictions on mobility, enforced by both landlords and communities, affected the pace of urbanisation and market integration in this region. In the Russian empire, serfs who paid their rents in cash or kind could often get permission to engage in migrant labour in nearby towns or cities, though they were not generally permitted to migrate permanently. They were still required to fulfill certain annual obligations on the estate – or at least hire someone to fulfill them in their absence. Serfs who owed regular labour on the landlord's demesne were less likely to obtain permission to leave, even temporarily. Communities, too, had a say in whether their members

²⁰ Examples of such practices can be found in Ogilvie, “The economic world”; Dennison, “Did serfdom matter?”; Dennison and Ogilvie, “Serfdom and social capital”.

²¹ Discussed in Ogilvie, “Communities”; Dennison and Ogilvie, “Serfdom and social capital”.

²² Ogilvie and Edwards, “Women”.

were allowed to travel, as well as in whether new householders could settle in the village. Landlords often required that a serf obtain the permission of the community before he or she would agree to issue travel documents.²³ Not surprisingly, then, this part of Europe urbanised much more slowly. In 1800, Russia's largest city had a population of only 250,000, where London already had nearly one million.

Finally, inhabitants of this part of Europe did not have access to the kind of centralised court system that existed in England. Under the "second serfdom" peasants had limited scope for recourse beyond the local community or the manor.²⁴ In Russia the situation was even more extreme, as serfs were generally considered the personal property of their landlords and thus had almost no rights before the law. If a landlord confiscated the property of a serf then there was nothing that the serf could do; there was no court to which a serf could take a case against a landlord. And in fact, there would have been no case to take, since serfs were not legally permitted to own land or engage in credit transactions. As a result, property rights were less secure and land and credit transactions much riskier here than in other parts of Europe. This does not mean that serfs did not engage in such transactions; the evidence indicates that they did. They would have been less likely, however, to engage in any large-scale innovations of the sort undertaken in early modern England.

Conclusion

[It is no coincidence that those places where agricultural productivity improved first were also the first to industrialise. For industrialisation to occur, it had to be possible to produce more food with fewer people. England was able to do this in the following ways {outline relationship of agric and indust rev}..... In other parts of Europe, institutional obstacles stymied this process. Industrialisation did not occur in these regions until much later, and when it did, it was not so much the gradual shift from agriculture to industry that we see in northwest Europe, as a sudden leap, initiated by the central state.]

²³ Dennison and Ogilvie, "Serfdom and social capital".

²⁴ There were some exceptions. In parts of Prussia, for instance, it was at least in theory possible for serfs to petition the Crown against their landlords. Hagen, *Ordinary Prussians*, chapter 9.

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