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ECONOMICS 303Y1

The Economic History of Modern Europe to 1914

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Lecture Topic No. 6:

II. GREAT BRITAIN AS THE HOMELAND OF THE INDUSTRIAL REVOLUTION, 1750-1815

G. The 'Agricultural Revolution' of the 17th - 19th Centuries:

G. The 'Agricultural Revolution' in England: during the later 17th to early 19th Centuries

1. The Agricultural Revolution in Historical Perspective: the General Character of Agrarian Change Since the 17th Century:

a) **A radical transformation of the agricultural sector:** in historical context

I) **in my view, such a transformation has always been necessary:** at least for almost all traditional societies and countries in order to permit modern urban industrialization and sustained economic growth.[1]

ii) **purposes:**

(1) to release labour, capital, and even land for more productive and profitable employment elsewhere in the economy, especially in the industrial sector;

(2) in particular, to supply labour, foodstuffs, and industrial raw materials for urban industrialization

(3) capital requirements for industrialization also came from agriculture, as well as from commerce & finance,

iii) **European comparisons:** we shall see how this principle was applied in both the 18th and 19th centuries.

(1) not only in the case of Great Britain during the Industrial Revolution era, and also subsequently in the 19th century

(2) But also in the case studies of France, Germany, and Russia, from 1789 to 1914

(3) In general, Great Britain succeeded best, in this transformation, followed closely by Germany, with Russia and France lagging behind (though Russia had wide regional variations).

iv) **That Great Britain was the first major country to achieve this radical transformation of the agricultural sector** is another important consideration in answering the perennial question about the origins of the modern Industrial Revolution: why was Britain first?

v) **Our first task:** is to understand the concept of an 'Agricultural Revolution'

b) **the so-called Agricultural Revolution and the accompanying 'enclosures' provide the chief focus on this topic –** of the later 17th to early 19th centuries, with a three-fold purpose :

I) **to ascertain when the fundamental period of agrarian change, the so-called Agricultural Revolution, took place:** i.e.,

(1) Before the Industrial Revolution: in the 16th or 17th centuries?

(2) During the Industrial Revolution era itself: from ca. 1760 to ca. 1820?

(3) After the first phase of Industrial Revolution: i.e., from the 1820s?

ii) **to examine how and why so much of the agricultural sector was transformed from essentially**

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[1] We can make exceptions, to this principle, for European colonial transplants, or British transplants: to North America and Australia, since the agrarian institutions exported were already modernized.

medieval feudal to modern capitalist foundations:

(1) the structure of early modern English agriculture as the heritage of medieval feudal-manorialism:

- with a system of communal, peasant-villager property rights
- even if they were tenants of powerful landlords (often aristocrats),
- a majority of them in the central and populous Midlands zone were, if no longer serfs, the descendants of serfs.

(2) this structure, with deep medieval foundations was being transformed, from the later 15th century,

- to a modernized economic system based on individual private-property rights:
- even if such lands, so transformed to achieve a complete private-property status, for landlords, was then rented out by those landlords to their tenant farmers.
- this was a long process, requiring several centuries, so that in this course we shall examine only the last and complete phase (from ca. 1750 to ca. 1830)

(3) Enclosure is the collective name for this radical transformation in property rights

- which in fact had actually first begun, in a very small way, as early as the 13th century, and
- but whose first major phases took place in Tudor-Stuart England, from the later 15th century through to the 17th century

(4) **For the overall significance, see my web document on *Major Themes in European Economic History*, for which I list the first two main themes as:**[2]

- The struggle for property rights: to acquire and defend property rights (and to 'capture economic rents') in land, labour, capital, and enterprise (intellectual property rights)
- The erosion of institutional impediments to a market economy and to European economic development: (inter alia) Feudalism, Manorialism, Serfdom, the Church

iii) **to examine how and why Enclosures facilitated or permitted major advances in agricultural productivity, and promote Industrialization?**

c) **A negative question:** why study agriculture and the agrarian sector of the economy in seeking the origins of the modern Industrial Revolution, in view of the following contrary or negative factors?

I) **Despite all the positive changes of the so-called Agricultural Revolution era,** nevertheless England or Great Britain never succeeded in feeding all of its growing population

(1) As I have argued before, England ceased being a net exporter of grains, from the 1770s, and became thereafter always a net importer of grains and other foodstuffs.

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[2] See my online web document: http://www.economics.utoronto.ca/munro5/Themes.htm

(2) by the late 19th century, almost 85% of Britain's national consumption needs for grain was met by imports – from as far away as India.[3]

(3) But, for the crucial phases of the Industrial Revolution era itself (ca. 1760 - ca. 1820), Britain was then far less dependent on food imports than was its chief rival, the Netherlands.

ii) **Growth rates in both agricultural productivity and total outputs:**

(1) agricultural growth rates were much less than in the other sectors of the economy, especially in the industrial sector

(2) **But growth rates are difficult to measure:**

- We have to distinguish between growth rates of productivity per unit of land and unit of labour
- And growth rates in total outputs: for as we shall see increased productivity in the 19th century seemingly paradoxically to a decline in total outputs – for logical reasons to be seen later

iii) **Furthermore, the industrial sector overall** probably did not succeed in achieving significant growth rates until the 1830s.

(1) That seemingly calls into question the concept of the Industrial Revolution

(2) But we can hardly expect technological and innovative entrpreneurial changes to produce overall positive growth rates in the beginning: so that the period 1760 to 1830 must be viewed as one of an incubation or embryonic developments for future real growth

d) **The importance of agrarian change for modern English and European economic growth and industrialization:** arguments for its vital importance

I) **agriculture still remained the largest sector of the economy in early-modern England and in all of early-modern Europe** (except the Low Countries and possibly Lombardy in Italy)**:**

(1) the agricultural sector, at the dawn of the modern era, still employed by far the largest proportion of the population.

(2) around 1500: agriculture (along with related forms of rural industries) engaged about 75% of the population in both England and France (compared to perhaps 85% - 90% in 1300);

(3) and, in this early-modern era, the agrarian economy employed up to 85% in eastern and south-eastern Europe.

ii) **importance of agriculture for rural manufacturing industries:**

(1) as just indicated, a very high proportion of the population engaged in agriculture in early-modern Europe also included some people who produced industrial goods,

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[3] See the ECO 303Y lecture no. 15 (January 2013: first lecture of the New Year).

(2) if only in terms of part-time employment, because that agrarian structure tied so much of the population to the land and thus helped determine a rural structure for so many industries;

(3) i.e., that reflected the basic inelasticity of the pre-industrial labour supply, especially for the manufacturing sector.

iii) **low agrarian productivity:**

(1) That agrarian structure, with a subset of rural industries, basically reflects a low level of productivity, per unit of manpower and per acre [or hectare: about 2.47 acres],

(2) and both productivity defects had to be transformed if real economic growth was going to occur.

iv) **in any event, for this course as a whole, on modern European economic history, agriculture and the agrarian sector are everywhere vitally important**:

(1) for the major goal of the course is to understand the economic and social processes that transformed fundamentally rural, peasant, agricultural societies into modern industrialized urban societies: i.e., transformed societies from being basically rural and agrarian to become largely urban and industrial (plus commercial/financial in scope).

(2) That means essentially the series of economic processes and transformation that liberated labour, resources (land), and capital from the agrarian sector to become far more productively employed as inputs in the commercial-financial and industrial sectors.

(3) Since we begin with England and the Industrial Revolution, we also want to see to what extent the English model of agrarian transformation was followed on the continent, when its major countries underwent industrialization in the 19th and early 20th centuries

e) **The Tasks of Agrarian Change to Promote European Economic Development and Industrialization:**

I) **The elimination of existing social and institutional barriers, many surviving from medieval times:** as just indicated, but worthy now of a more precise repetition

(1) in the form of two related socio-agrarian institutions that still survived the medieval era:

- manorialism (also called seigniorialism):[4] the economic foundations for medieval feudalism;
- communal peasant land tenures and communal farming organizations, which had been part of medieval manorialism, in England and in much of northern continental Europe.
- indeed, from Ireland to Russia (as we shall see in the second term), when we examine similar agricultural transformations in France, Germany, and Russia (including Poland, Ukraine).

(2) and to replace them with contractual private property rights that allowed both land and labour to respond

[4] Seigiorialism: from the French word *seigneur* = lord: i.e., a feudal lord, and thus economic lordship. See my ECO 301 lectures nos. 5 and 6: http://www.economics.utoronto.ca/munro5/lecnot301.htm

to market forces:

(3) In England, most of those barriers, except for communal agriculture under manorialism, had disappeared by the 16th or 17th centuries;

(4) **Serfdom:** did it remain problem?

- that means the bondage of peasants to their tenancies on manorial estates, though with a status better than that of slaves: to be examined in more detail in the second term
- Certainly in England, from the 16th century, there was no longer any problem of peasant serfdom, in terms of arbitrary manorial exactions and legal constraints on labour mobility (i.e., peasants were no longer bound to the manor)
- but it continued to be a major problem and economic barrier on the continent, especially in central and eastern Europe, linked closely with manorialism, as we shall see in the second semester: for France, Germany, and Russia
- serfdom in central-eastern Europe was not in fact abolished until the mid to late 19th century

(5) **Thus,** in much of northern continental Europe, especially eastern Europe, the medieval vestiges of feudalism, manorialism (seigniorialism) and communal agriculture remained as very strong barriers up to the 19th century.

(6) **indeed, as noted earlier, and to repeat with emphasis once again: we shall see how important these barriers remained on the continent:** and in examining the economic history of France, Germany, Poland, and Russia next term.

ii) **Second task of agrarian changes: To increase productivity per acre of land and per unit of manpower engaged:** to increase outputs at ever lower unit costs.

iii) **Thus the third task: to liberate labour and other economic resources, as previously stressed,**

(1) **for more productive employment elsewhere in the economy:**

(2) and thus to reduce the proportional share of the agrarian sector in a rapidly changing economy.

f) **Increasing Agricultural Productivity had these more particular, specific objectives**:

I) **first, to repeat: to liberate labour from the soil**: to be employed more productively in other sectors of the economy, especially urban sectors: trade, finance, and manufacturing industry.

(1) In England, the proportion of the population engaged in agriculture fell

- from 76% in 1500 to 46% in 1750,
- to 22% in 1850,
- and to just 7% in 1900

(2) In France, in sharp contrast, that proportion fell only from:

- 73% in 1600 to 61% in 1750,
- and to just 43% in 1900

(3) A prime goal of modernizing the agricultural sector was to achieve such reductions.

ii) **to supply increasing foodstuffs to permit growth of urban industrial populations**: and those of the economic sectors with urban settings, i.e., commerce and finance

iii) **to supply more industrial raw materials**: especially for the various textile industries, which were then the major manufacturing industries (woollens, worsteds, linens, fustians).

iv) **to supply capital (from agrarian rents and profits)**: also to be invested more productively in other sectors of the economy.

v) **to increase rural market demand for manufactured goods**: when and for which the rural economy provided generally still the largest market.

g) **These productivity objectives remained, however, limited in scope, from the 1760s:**

I) **current estimates of growth in agricultural productivity,** during the Industrial Revolution era,

(1) are indeed much higher than older estimates,

(2) nevertheless productivity growth in industry and trade well outstripped those in agriculture.

ii) **Indeed, as also noted earlier, the so-called Agricultural Revolution that both preceded and accompanied the Industrial Revolution, failed to feed all of Britain's growing population:**

(1) so that, as noted earlier, Britain became a net food importer from the 1770s, having been a net food exporter for the previous century (from the 1660s).

(2) at best, the so-called Agricultural Revolution, succeeded only in reducing the amounts and values of necessary food imports, which, as noted earlier, were proportionately far greater in the Netherlands during the later 18th and early 19th centuries.

(3) Yet the agrarian changes did meet other objectives: in terms of releasing labour and other resources from the agricultural sector to be more efficiently employed elsewhere.

iii) **As I stressed earlier, British economic growth from the later 18th and 19th centuries fundamentally depended on industrialization and its related commercial expansion:** i.e.,

(1) to permit the growing imports of much cheaper foreign foodstuffs, from export earnings: of both industrial goods and services (and especially services).

(2) Otherwise, there could have been no demographic revolution accompanying the Industrial Revolution: one that allowed the population of England and Wales to double (almost) from 1751 to 1821 (6.342 million to 12.269 million) and then to triple from 1821 to 1911 (to 36.136 million).

h) **The Mechanics of Rising Agricultural Productivity in Early-Modern Europe to 1800:**

Note: Before the 19th century, modernisation did not mean mechanization but the following changes in land use:

I) **Enclosure**:

(1) changes in land-tenure or land-holding to replace communal forms of agricultural with structures based private property institutions,

(2) which both economized on labour and promoted superior farming techniques.

ii) **Changes in cultivation techniques involving complex crop rotations**, **and with animals**

(1) which also changed the relationship between livestock raising and crop cultivation (known as 'convertible husbandry'),

(2) designed to improve soil fertility and thus output.

iii) **The significance of all these agrarian changes can be best understood by examining what they displaced,** in the form of traditional communal agriculture in northern Europe, from Ireland to the Ural Mountains of Russia.[5]

2. The Barriers to Agrarian Changes and Economic Development: The Open or Common Field Systems

a) **The Organization of Communal Agriculture in Northern Europe: the 'Common Field' or 'Open Field' Systems of Peasant Tenant Agriculture**: must be clearly understood

I) **This was a system of peasant tenancy agriculture, practised by peasants in northern Europe:** (1) The British Isles (including Ireland) and continental Europe north of the Loire river in France and north of the Danube in Central Europe, and eastward through Poland and Russia to the Ural Mountains:

(2) **A medieval manor was divided between:**

- the lord's demesne (domain): usually the best and largest arable lands, pasture lands, and for forest lands, for the manorial lord's exclusive use
- and the peasant tenancies: surrounding or distant from the demesne lands

(3) **the peasant tenants were subject to the economic and judicial control of feudal manorial lords:** i.e., they rented their farm holdings from great landlords, often military landlords or ecclesiastical lords (bishops, etc).

(4) peasant paid feudal-manorial rents to their lords in three forms (often combined):

- labour services on the lord's demesne lands: chiefly arable lands

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[5] Next term, when we come to study France, we will also look at the very different Mediterranean farming methods for the southern half of the country.

- in kind: i.e., as a share of their own harvests
- in money: in silver coin

(5) Over time cash money rents came to displace other forms of rent, as labour services and payments in kind were 'commuted' or transformed into money rents, which became almost universal by the 15th century.

ii) **In medieval and early modern England**, open field farming was, however, not universal:

(1) It was chiefly concentrated in what is called the Midlands belt (see map): which was precisely the very region that had been subjected to medieval feudalism, manorialism, and serfdom:

- feudalism: as a militaristic system of government, based on military service and rewards
- manorialism: the agrarian economic superstructure: to support the feudal lords
- serfdom: a dependent peasantry, tied to the manorial estate, to work the lord's lands for his benefit – paying rent for land in the form of labour services + money (or kind)

(2) but *excluding* parts of the counties of East Anglia (Norfolk and Suffolk) and the Home Counties near London (Kent, Middlesex), the SE counties, Wales, and the North East,

(3) for these regions had evidently *never* experienced either feudalism, manorialism, or this system.

(4) These other regions, without open field farming, largely consisted of either:

- individual peasant proprietorships and hamlets; i.e., with small compact individual holdings
- or large areas of unfenced pastoral lands for raising cattle, sheep, and pigs

iii) **This largely manorial peasant tenancy system goes under both names,** each of which defines certain central characteristics of the farming system:

(1) 'Open Field': because croplands worked by the peasant tenants were not organized as individual plots but were cast as large, open or unfenced fields.

(2) 'Common Field:' because the peasant tenants worked these great open fields of croplands to a considerable extent communally, and not individually:

- i.e., teams of peasants ploughed all their lands and harvested all their lands together;
- and grazed their livestock in common both in common pastures (or waste lands) and on the arable fields after harvesting.

iii) **The crop-zones of the Open Fields could be organized as either a two-field or a three-field system of crop rotations**: let us consider the three-field system, which had become predominant:

iv) **This so-called Open Field or Common system:** pertained to almost half of the arable lands of Britain even as late as the early the 18th century:

b) **The Mechanics of the Three-Field System of Crop Rotations**

MODEL OF THREE-FIELD CROP ROTATION SYSTEM:

ARABLE LANDS in cultivation in Northern Europe

Year	FIELDS: A	FIELDS: B	FIELDS: C
I	**FALL (Winter)** Wheat or Rye; and/or Winter Barley ('berecorn')	**SPRING** **(Summer)** Oats, Barley Legumes (Peas and Beans)	**FALLOW** Resting Uncultivated (Double Ploughed)
II	**SPRING**	**FALLOW**	**FALL**
III	**FALLOW**	**FALL**	**SPRING**

I) **Fall or Winter Fields (Fields A)**:

- consisted of crops that were planted in the Fall, grew in the Spring, and were harvested in mid Summer:
- grains such as winter wheat and rye (rye being a northern crop in origin);
- and also winter barley ('berecorn').

ii) **Spring or Summer Fields (Fields B)**:

- fields that were planted with both grain and vegetable crops in the Spring and harvested in the Fall (Autumn).
- **The additional grains were oats and barley**:

  (1) **oats** were particularly important in serving as a foodstuff or fodder for livestock, especially for horses (more powerful and speedier than oxen), which could not be properly fed as draft animals in south;

  (2) **barley** served not only for bread and porridge but for brewing beer [south: wine].
- **the vegetables were green vegetables**: principally beans and peas, which are technically known as legumes, because they added nitrogen, the most important fertilizer, to the soil.
- **That nitrogen** came not from the plants themselves but from the parasitic bacteria that lived on their roots: bacteria absorbed inorganic nitrogen from the air, which they transformed into organic nitrogen compounds (with carbon, oxygen, and hydrogen) that were fixed in the soil when the bacteria died and decomposed.
- This additional nitrogen, in restoring some fertility, helps to explain why this field could grow a

summer crop after having grown a fall-winter crop the year before.

- But the nitrogen-fixing properties of beans and peas were rather limited.

iii) **Fallow Field (Field C)**:

- these were the fields, about one-third of the village arable, that were left uncultivated for one year, to rest and allow nature to recuperate and restore natural fertility.
- Livestock would graze on any natural grasses growing there, on the fallow (as well as on the other arable lands, after harvesting -- graze on the stubble).
- Livestock would also provide a dividend in form of manure, but really only if they received some food elsewhere, off the field (as in stall-feeding).
- They might fix nitrogen in the form of manure more quickly in the soil (so long as the manure was ploughed in);
- but they would not provide a net addition to fertility over the long run, I must stress, unless fed from outside sources.

iv) **The Village 'Commons': the Pasture, Meadow, and Wood Lands**:

- lay beyond and often around the great open arable fields (croplands), and were always physically distinct from these arable lands.
- They served not only for grazing and otherwise feeding all kinds of livestock, but also as a source wood and wild fruits.

v) **Crop Rotations on Arable Fields:**

(1) would thus occur over a three-year cycle, involving these three sets of arable fields.

(2) Thus each set of fields would receive a Fall-planted (winter) crop one year, a Spring-planted (summer) crop the next year, and lie fallow, at rest, the third year;

(3) and thus each set of fields would produce two sets of crops every three years.

vi) **Livestock**: in mixed farming (husbandry) systems

(1) was really the most vital component of northern common or open field farming;

(2) and that England especially came to have such a large livestock component in its agriculture was a major asset, which also explains its relative complexity.

c) **Why were livestock so important?**

I) **to provide power**: oxen and/ or horses to pull the very large and heavy wheeled ploughs necessary to cultivate the wet clay soils of northern Europe:

(1) livestock choices: for a typical medieval peasant plough team, either

- eight oxen, or

- two horses

(2) horses were thus both swifter and more powerful

(3) economic drawback to using horses:

- horses were more expensive to feed: requiring oats, in addition to hay and grasses

- plough horses, as capital, may not have been more expensive, however, to purchase than oxen

- transition from oxen to horses took considerable time – centuries – in northern Europe.

ii) **to provide manure** and restore nitrogen to the soils: as already noted, for fertilizing the arable fields.

iii) **to provide auxiliary sources of food, especially protein**: in the form of meat and dairy products -- milk, butter, cheese.

iv) **finally, to provide raw materials for widespread rural manufacturing**:

- wool from sheep: to manufacture various forms of wool-based textiles: woollens and worsteds (to be seen later, under Industry)
- hides: the leather from both sheep and cattle,
- bone: a most important material serving many functions of modern metals and plastics.
- barley: for rural (and then urban) brewing (beer and ale): very major industry

v) **For the vital importance of livestock in European economic development,** see Jared Diamond, *Guns, Germs, and Steel: the Fate of Human Societies* (New York, 1999):

(1) He contends, that of the many physical advantages that allowed Europe to develop to become the economically and militarily predominant continent, the most important was its livestock component.

(2) That is, no other region of the world had a comparable set and economically advantageous combination of these large domesticated animals.

- for both warfare – i.e, the vital importance of horses)
- and for agriculture: horses, oxen (with bulls and cows and calves), sheep, donkeys, goats

(3) Consider that sub-Saharan Africa's indigenous animals, though certainly large,

- were too fierce to be domesticated (rhinoceros, hippopotamus, lion;
- only the elephant had some limited use)
- but by early-modern times cattle were introduced into sub Saharan Africa[6]

(4) The Americas, before the arrival of the Spanish (who brought horses, from the 16th century), had had no such animals, except for llama, a poor substitute for horses and cattle

(5) Asia did have buffaloes and camels, as well as horses (in the northern steppes),

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[6] Note that horses, sheep, and cattle had long been used in North Africa, from Egypt to Morocco, as well as in the Middle East: i.e., all along the southern & eastern Mediterranean coasts.

- but not in the same relative supply and
- not used or usable in as economically advantageous manner as Europe's large domesticated animals.

(6) **Most important:** no other region outside of Europe managed to integrate the use of both arable crops and livestock in such an effective manner: known as animal husbandry or mixed farming.

(7) **Within Europe itself**: the North was much more advantageously endowed than the South, a factor that I shall stress again when we come to France, in the second term.

d) **The Communal Features of Open Field or Common Field Farming:**

I) **Communal grazing:** on both pasture (or meadow) and arable lands:

(1) That meant first that the entire village livestock herds, i.e., of the whole peasant village community,

- grazed on all these lands together, pasture and arable,
- rather than separate grazing by each peasant family in individual segregated flocks on their own family holdings.

(2) Communal grazing on large open fields was much more land efficient than grazing the livestock separately on small plots, on which the livestock would necessarily have been tethered (tied to a stake), to prevent trespassing on neighbouring lands.

(3) The village livestock herd (sheep and cattle) were communally grazed not only on the pasture and waste lands, but also on the arable fields themselves after they had been harvested

- i.e., feeding on the post-harvest stubble; and
- grazing on the fallow lands, feeding on naturally growing grasses on the fallow.

(4) Continued population growth first led the peasants (or landlords) to expand their arable lands at the expense of waste and pasture lands;

(5) as pasture lands became more and more scarce they were then forced to graze their livestock on the stubble of open arable fields, after harvesting.

(6) And many historians believe that this problem of growing population pressures, forcing the arable to expand at the expense of scarce pasture lands, explains the original foundations and reasons for the establishment of Open Fields in northern Europe.

(7) Consider Table 1, below, in the Appendix, on the changing arable to pasture ratios, with population growth and diminishing returns.

(8) Communal grazing of the livestock, sheep and cattle, on these arable lands was important in helping to restore fertility to the soil: i.e., in supplying extra manure to these lands (called 'folding');

(9) but, as noted earlier, net additions to soil fertility came only from feeding the livestock with extra fodder supplied from outside these arable fields.

ii) **Thus the necessity for open unfenced Fields**: because fencing of individual holdings would prevent this form of livestock grazing.

iii) **Scattering of strips that formed the peasant tenancies:**

- The peasant tenancies in open fields were not constructed as separate blocks of land;
- but instead, the peasant tenancies were constituted as a collection of strips that were scattered and intermingled with those of other tenants, in each of the three fields or agricultural zones.
- Why were the strips and thus the tenancy holdings of the peasants so scattered?

iv) **some explanations for scattering of tenancy strips in the open fields:**

(1) **diversification as risk aversion by the peasant community: the McCloskey thesis** [7]

- to give peasant families some shared access to both good and bad lands for all kinds of crops; lands of higher and lower fertility; lands with varying degrees of risk of loss from frost, flooding, insects, rodents, and crop diseases.
- Even if this system meant some inefficiencies, especially in walking to scattered strips, and thus lower than optimum outputs,
- most peasants probably preferred this lower risk and added security to maximum output:
- just as modern investors might also prefer in diversifying securities in an investment portfolio, while accepting lower yields.

(2) **To protect livestock grazing: the Dahlman thesis.** [8]

- Peasants required large economies of large scale for livestock raising -- i.e., large blocks of open land,
- while many preferred to grow crops on small plots of land: i.e., land-extensive versus land-intensive forms of agriculture.
- But if some peasants had decided to pursue arable agriculture by buying up parcels of land from neighbours, consolidating them into solid blocks, and then withdrawing that block from the communal system, they would seriously undermine the economics of livestock grazing;
- and thus strip-scattering was designed to discourage land consolidation and alienation from the open

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[7] See Donald McCloskey, 'The Persistence of English Common Fields', in William N. Parker and Eric L. Jones, eds., *European Peasants and Their Markets: Essays in Agrarian Economic History* (Princeton, 1975), pp. 93-120. See also the following essays: Richard C. Hoffmann, 'Medieval Origins of the Common Fields', pp. 23-71; D.N. McCloskey, 'The Economics of Enclosure: A Market Analysis', pp. 123-60.

[8] Carl J. Dahlman, *The Open Field System and Beyond: A Property Rights Analysis of an Economic Institution* (Cambridge, 1980). See chapter 2, 'Theories of the Open Field System', pp. 16-64; and chapter 4, 'The Economics of Commons, Open Fields, and Scattered Strips', pp. 93-145.

fields.

- to repeat: to permit livestock grazing on both post-harvest arable fields and on the fallow.

(3) **Potential gains from using village labour in common:** communal labour and capital

v) **Communal Ploughing**:

(1) Communal ploughing was a common feature of much northern open-field farming: especially

- on heavy, wet, river-valley soils that required very large and costly ploughs
- and also a large plough team, with eight oxen or two or more horses.

(2) The cost of acquiring such a plough team was generally far too great for most of the poorer peasants as individuals;

(3) and thus several families had to pool both capital and labour to acquire and operate the plough and the requisite draft animals: either eight oxen or two horses.

vi) **Communally Determined Crop Rotations by a village council**:

(1) the crop rotations were applied to the village arable lands as a whole (at least those of the peasant tenants) and not to individual holdings.

(2) A village council, led by the major peasant farming families, determined both

- the division of lands between livestock and arable, and
- most of the seasonality of crops to be grown, in what order.

(3) Obviously totally independent or private, individual farming, with individual initiatives on crop cultivation, could not be permitted with communally organized farming: especially so once the village decided to allow livestock grazing on harvested fields.

(4) Livestock could not be allowed on the fields until harvesting completed;

(5) that meant a common harvest with the same type of crops (winter, summer) in each field.

vii) **Private aspects of early-modern communal farming**: the following factors distinguish medieval open-field from modern-day collective or communal farming (as practised in the former USSR -- still surviving in Russia and Ukraine -- or in Israel):

(1) the crops and other products of the land and livestock still belonged to the individual peasant tenant, not to the village community. Indeed much of the cultivation remained individual.

(2) Some individual choice permitted in crop selections

- i.e., beans, peas, oats, barley, etc. in Spring plantings; or winter barley in the Fall plantings),
- so long as peasants did not violate the seasonal and biological rotations.

e) **The Low productivity of Communal Open-Field Peasant farming**: lower than the potential that could be achieved with individual holdings.

I) **Resistance to Change**:

(1) in that all decisions involving changes in crop rotations, lay-out of the fields, balance between livestock and arable etc. had to based upon the common consent of the villagers,

(2) in reality the unanimous consent of the village council, a council of more prominent families and their elders.

(3) That did not mean that change was impossible; but it meant that change was obviously much more difficult to achieve than it would be under single, unified land-management.

(4) Consider again McCloskey's 'Risk Aversion' thesis to explain the scattering of peasant tenancy strips in the open arable fields.

ii) **'The Neighbourhood Effect':** i.e., that the more productive farmers were victims of careless neighbours: who did not rid their strips of weeds or try to control pests.

iii) **Wastage in tending scattered strips**:

(1) Lower productivity with scattered strips than was possible with unified plots using existing techniques:

- in particular from the waste labour involved in tending scattered strips,
- labour time lost in walking from strip to strip, in order to sow seeds, harrow the soil, remove weeds, etc..

(2) wastage from the lost use of the land, known as 'balks', involved in separating the strips of the peasant tenant holdings.

iv) **Peasant Immobility and Disguised Unemployment**:

(1) In the medieval past, that immobility had been a condition of peasant serfdom,

- whereby servile peasants were bound to their landlords or to the estate itself by birth,
- and were forbidden to leave their holdings without his permission
- conditional upon payment of heavy fines or fees, in compensation.

(2) but after western serfdom had withered away in the West, much of the peasantry was still, for all intents and purposes, immobile, bound to their village lands by family ties in this system of communal village cultivation.

(3) Later, when we come to 19th-century central and eastern Europe -- to Germany and Russia:

- I will stress the problems of a still very widespread and deeply entrenched serfdom, which had really only developed from the 16th and 17th centuries;
- and then that growing stain of serfdom bound the peasants to the land, as mere chattels of the lord, far more so than was ever true in the West.

(4) Immobility meant inelastic labour supplies, potentially raising wage rates for alternative forms of

employment (i.e., this system denied employers a ready supply of free labour).

(5) meant disguised unemployment in some villages or districts, as the counterpart to labour scarcities in others.

(6) Indeed communal open-field farming with tenancies in form of scattered strips was well designed to accommodate disguised unemployment of surplus peasants and to maintain communal harmony.

3. Enclosures and the Destruction of Communal Open-Field Farming

a) **Enclosures:**

I) **It provided the economic antithesis of communal open field farming,** as just discussed;

ii) **This involved a system of private property,** which necessarily meant the destruction and removal of communal peasant farming, indeed throughout Europe,

iii) **But enclosures took place over a very long period of time,** up to the 19th century

b) **The Forms and Nature of Early-Modern Enclosures:**

I) **Definition:**

(1) **Placing land under single management**: to extinguish any collective, common or village communal rights to the use of that land;

(2) that usually meant fencing off lands to prevent other villagers & livestock from using that land.

ii) **Conversion of Land from Communal Use to Private Property**: Thus private property rights, enforceable under law, meant the following:

(1) the right of the owner to exclude anybody else access to the land, by legal force in necessary;

(2) but also the right to lease the land to a tenant of his own choosing

(3) thus the right to reorganize the use and disposition of property in response to market forces;

(4) the right to sell, trade, bequeath the land or amalgamate it with other lands;

(5) the right of the owner to bequeath, sell, transfer, trade, lease the land

(6) the right of the owner to appropriate the income, the stream of rents from the use of this land:

(7) The right of the owner to pledge the land as collateral for a loan, i.e., to raise capital; and obviously no peasant village community could pledge the entire village loans to secure investments.

iii) **Enclosure could be undertaken by either the landlord or by his leading tenants**:

(1) in most cases, enclosure occurred in a piecemeal fashion, probably beginning with the village commons, rather than all at once (despite the best efforts of the village community collectively to discourage such enclosures).

(2) While some landlords did undertake enclosures as capitalist farmers, to work their estates for profit, most

in fact chose to rent out newly enclosed lands to tenants, by leases for stipulated number of years.

c) **The Physical Forms of Enclosure**:

I) **Enclosure of the Village Commons**:

(1) fencing off the village common lands -- the pasture, meadow, and woodlands and common waste for the exclusive use of just one tenant or the landlord, especially for livestock raising.

(2) Such enclosures thus meant the physical suppression of communal livestock grazing rights, villagers loss of access to wood and other forest products.

ii) **Engrossing of the Arable Open Fields**:

(1) This meant the redistribution and consolidation of those scattered, intermingled tenancy strips into compact, unified farms -- that were

- either absorbed into the landlord's estate or
- more usually leased to just one tenant.

(2) Such engrossing was usually followed by withdrawal of these lands from the common rotation and then by fencing.

(3) That generally also meant peasant displacement as larger, more efficient farm units were worked with proportionately less labour.

iii) **Reclamation of Waste Lands**:

(1) Turning waste land into productive lands; i.e., conversion of moorlands, marshes, then fenlands, forest and scrubland into either pasture or more often arable lands.

(2) This type of enclosure was obviously much more socially beneficial than the other two types because it added new agricultural lands promoting new settlements and the employment of more labour.

(3) Most famous example is the drainage and cultivation of the Fenlands of East Anglia in the 17th century (Norfolk, Suffolk, Cambridgeshire).

f) **Potential Economic Gains from Single (Unified) Management of the land:** innovation and productivity gains:

I) **Unified or Single management**: so that one person, whether landlord or his tenant, made all the decisions on land use, and was able to effect change without having to gain communal consent, as with Open Field manorial farming.

ii) **Ralph Davis: on the peasantry and agricultural innovation**:[9]

> No class of users of the land was less able to innovate [than the peasantry]; and great

[9] Ralph Davis, *The Rise of the Atlantic Economy*, World Economic History series (London: Weidenfeld and Nicholson, 1973) , p. 115**)**

> numbers of them were subsistence farmers who grew [grain], not for the market except in years of unusually good harvest, but for their own families. Though peasants were by no means unwilling to innovate if the practical advantages were clear and the risks small, they had the least facilities for information, the least resources to bear the costs and risks of change, the least capacity to co-erce their slow-moving fellows into the cooperative effort that was usually necessary for large-scale changes. It was not easy for landlords to compel the peasant community of a village to try new ways so long as most tenures gave the peasants security at more or less fixed rentals, and the key to extensive rural change had to be found eventually in the breaking down of old tenures so that peasants could be subjected to economic pressures, or alternatively forced out in favour of market-oriented farmers.

iii) **Examples of changes that could be better effected by individual control**:

(1) to decide on division of land between arable and pasture;

(2) the adoption of convertible husbandry, a much more advanced system, with periodic alternation between arable and pasture, without fallow [to be explained later, in the section on technical change]

(3) similarly, on arable lands, to adopt much more complex crop rotations, with a crop diversification away from dependence on grains, with goal of reducing the fallow.

(4) pasture and livestock: to engage in the selective breeding of livestock (impossible with communal grazing of livestock).

g) **Potential Gains from Land Consolidation and Economies of Scale:** Reorganization of tenancy lands into large compact unified farms with much greater operating efficiency:

I) **Labour Economies:**

(1) On overcrowded lands, enclosure provided greater labour efficiencies: by displacing the surplus population, by getting rid of disguised unemployment.

(2) In so far as that did mean ‘depopulation’ (though it never meant total depopulation), it also meant some increased productivity of labour.

ii) **Land Efficiencies:** Conversely, on underpopulated lands where arable farming was not efficient, because of scarce labour, enclosure here meant greater economic efficiency by transforming some or all of the land to livestock farming (sheep raising, dairying, etc.).

iii) **Capital to Land Ratios:**

(1) Large unified farms permitted more capital investment in farming (especially with one capitalist farmer deciding on investments):

(2) particularly in term of livestock raising, artificial irrigations, land drainage, land reclamation and other technical improvements;

(3) but that is true only to a certain size, beyond which capital became inefficiently utilized, so some recent studies are suggesting.

iv) **Possibility of achieving increasing returns or greater economies of scale in both production and marketing,** where much larger marketable outputs justified increased investments.

v) **Greatly facilitated the financial ability of both landlords and leasehold tenants holding enclosed farms to raise capital by borrowing on mortgages:**

(1) i.e., to pledge either the lands, or the products and fruits of the enclosed lands, as security for a mortgage loan.

(2) That would have been difficult, if not impossible, for common field tenants, holding scattered and interspersed strips, to mortgage their properties in similar fashion, simply because no single person had individual private-property rights over the use of such lands: who would lend money on the security of communal property, when no individuals could be held responsible?[10]

vi) **Allowed manorial landlords in particular to regain the sole use of former demesne lands:**

(1) In medieval feudal-manorial agriculture, a manorial estate had been divided into two sections:[11]

- the demesne (domain: from 'dominus': lord, in Latin): the central arable and pasture lands of the estate, usually the best lands, worked for the sole benefit of the lord
- the peasant tenancy lands: other lands lying beyond the demesne lands, that once servile tenants held from the lord in return for rents that were paid in money, kind (share of the produce), and labour services on the lord's demesne

(2) From the 1380s to the 1420s, most manorial lords (at least in the Midlands), found that falling agricultural prices (grains and wool) and rising costs made demesne agriculture unprofitable: i.e., as manorial lords became victims of a price-cost squeeze.[12]

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[10] See Patricia Hudson, 'Land Markets, Credit and Proto-Industrialization in Britain and Europe', in Simonetta Cavaciocchi, ed., *Il mercato della terra, seccoli XIII - XVIII*, XXXV Settimana di Studio, Istituto Internazionali di Storia Economica 'Francesco Datini', vol. 35 (Florence: 2003), pp. 721-42. She states: 'The period of expansion of domestic manufacturing of woollen and worsted cloth in Yorkshire in the later eighteenth century was accompanied by a quickening of the pace of enclosure and enfranchisement and by increasing activity in the land market. It is probable that the pressure for enclosure in this period was partly a result of the desire of artisan clothiers and putting-out employers to acquire fixed title to land and hence to a greater call upon loan capital and credit....Land mortgages were often the preferred security. Land was tangible and useful and a mortgage also carried greater liquidity than other forms of investment, such as stocks and bonds.'

[11] For a better understanding of this complex topic, see my lectures in ECO 301Y given last year: nos. 6 and 7 (in October); lecture 17 (in January): http://www.economics.utoronto.ca/munro5/lecnot301.htm

[12] See my recent publication: John Munro, 'The Late-Medieval Decline of English Demesne Agriculture: Demographic, Monetary, and Political-Fiscal Factors', in Mark Bailey and Stephen Rigby, eds., *Town and Countryside in the Age of the Black Death: Essays in Honour of John Hatcher*, The Medieval Countryside,

(3) So most of these lords leased out portions of their demesnes, in piece-meal fashion, to their peasants, for fixed annual cash rents only, and without servile obligations.

(4) this was a major factor in the decline of English serfdom (or 'villeinage' – as the more common term used in the economic-history literature)

(5) in doing so, many manorial lords had allowed their remaining demesne lands to become intermixed with peasant tenancy strips in the Open Fields: to gain the advantage of peasant communal ploughing of all arable lands in the Open Fields

(6) When the behaviour of rising prices (grains and wools) and relatively falling costs again made demesne agriculture profitable, from the later 15th century:

- many such lords found that the only method of regaining full control over their demesnes was to enclose the Open Fields
- and also to gain back former demesne lands that had been leased out to tenants.

(7) We will find, in the second term, that such motives also prevailed in 19th-century German, Polish, and Russian agriculture.

(8) German historians have indeed used the following terms to indicate the two basic types of manorial economies

- *Gutsherrschaft*: a manorial economy in which the bulk of the lords's revenues are derived from the commercial exploitation of the demesne lands, using servile labour to work the demesnes lands (i.e., rent in labour rather than in money)
- *Grundherrschaft*: a manorial economy in which the lord's revenue are largely derived from the fixed cash rental payments from a largely free (non-Seville) peasantry.

h) **But enclosure did not guarantee more rational land use and economic advancement**:

I) **at best,** enclosure made it easier for an enterprising landlord or tenant farmers to effect changes and realize these goals, but it did not compel them to do so.

ii) **Nor did larger farms in any way necessarily mean more efficient farming:**

(1) Many studies show that relatively small farms can be efficient: evidence from the Low Countries.

(2) Some Enclosures may have been economically beneficial in breaking up some very large estates into more manageable sized capital farms.

h) **The History of Enclosures in England:**

I) **the two most famous eras of enclosures were during:**

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vol. 12 (Turnhout: Brepols, 2012), pp. 299-348.

(1) The Tudor Stuart era from the late 15th to early 17th century; and

(2) The Industrial Revolution era, from ca. 1760 to 1820; but

ii) **many historians, however,** contend that it was an ongoing process just as important in the intervening era as well, especially the later 17th century, where we will begin.

iii) **The historic importance of the English Midlands**: the dozen or so counties in the middle zone of England, which was:

(1) As noted earlier, this was the very region that had been most thoroughly subjected, from medieval times, to feudal manorialism and to communal forms of agriculture.

(2) geographically a zone suited almost equally to livestock and arable (crop) farming

(3) For that reason especially, the most densely populated region of England (along with East Anglia)

(I) **The Motives for Enclosures:**

I) **Profit Maximization and Rent Extraction**: was obviously the overriding motive, for both landlords & tenants

(1) to extract greater profits from commercial farming, by re-organizing agricultural production to produce more cash crops and livestock products to be sold in local, especially urban markets.

(2) to convert older forms of inheritable peasant tenancies into shorter term leaseholds: to extract greater economic rent from the land: see the document on Ricardian Economic Rent.[13]

ii) **that in turn obviously necessarily had meant a change in landlord mentality:**

(1) a change from a feudal mentality that had looked upon land as a means of supporting political and military power to become, eventually:

(2) a more capitalist mentality that sought to exploit the land for market-oriented profit potentials.

iii) **Here I cannot go into the very complex story of the first major wave of enclosures in the Tudor-Stuart era, from the 1480s to the 1620s, except to note the following:**

(1) The role of the rapidly expanding cloth trade in this era:

- to provide an economic incentive to convert arable lands occupied by peasants into vast sheep farms.
- to produce the wool for those cloth exports, especially at the beginning when grain farming was less profitable.

(2) The transfer, during this era, of a vast amount of agricultural lands from the hands of the old feudal-military aristocracy, the Church, and the crown (king) into the hands of a non-noble class of landholders called the gentry, with a more capitalist mentality.

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[13] http://www.economics.utoronto.ca/munro5/ECONRENT.htm

(3) the term *gentry* applies to those upper-class but non-noble landowners,

- including those of the former knight-class called 'Sir', and those descended from wealthy merchants, professional men, state office-holders,
- who had acquired large landholdings, often by buying manors or estates from impoverished members of the traditional feudal aristocracy.
- Since many were of urban professional and mercantile origin, many looked upon these landed estates as a source of larger profits.

(4) But many of the old landed feudal families also took part in these enclosures.

j) **Factors that hindered or limited conversions of communal lands into enclosed lands:**

I) **The important question to be asked here** are these:

(1) why did some landlords succeed in their enclosures, while others failed to achieve these objectives, if they had indeed sought to enclose their estates?

(2) and thus why was the Enclosure movement so long drawn out?

- beginning, in earnest at least, in the 1460s and continuing up and past the Industrial Revolution era
- On the eve of the Industrial Revolution, in the 1760s, perhaps 75% of the cultivated land of England finally been enclosed
- the remaining 25% was subsequently enclosed, but the enclosure movement was not completed until the 1820s or 1830s

ii) **The explanation for the long delay concerns the relative degree and force of property rights:** (1) Across England, and especially in the Midland zone of open-field farming**,** the legal conditions that governed peasant tenancies varied widely,

(2) so that some peasant had much better protected property rights than did others;

(3) and some had virtually no property rights at all, or very limited rights.

iii) **These were following groups of tenants:** and their property rights or conditions of tenure

(1) **Freeholders:**

- A small minority of peasants were considered to be freeholders: while they paid rents as tenants, they paid only limited fixed rents, often minimal rents,
- with full rights to bequeath their lands to their children by inheritance, without interference from manorial landlords;
- their property rights were fully protected by royal Common Law courts.

(2) **Leaseholders:**

- A somewhat larger group of peasants of small farmers were those who rented their lands -- often

lands that had been carved out of the lord's demesne (domain: central holdings) -- by written contracts or leases that specified rents to be paid for a limited number of years.

- While landlords could not cancel leases during their term, they could refuse to renew them, and thus enclose these lands on the expiry of the leases.

(3) **Copyholders or Customary Tenants:** [14]

- The largest single group of peasant tenants in Open Field zones were those who were descendants of medieval serfs,
- whose ancestors had converted their servile labour obligations into cash rents by agreements with the manorial lord,
- the term copyholder means 'tenure by copy of the court roll according to the custom of the manor': and thus they were also called customary tenants.
- these tenancy agreements were recorded on the parchment (i.e., sheep skin) rolls of the manorial courts, with a copy given to the peasant family
- These copyhold contracts were generally not protected by royal or Common Law courts, but they did specify conditions of inheritance for the peasant tenancy that were subject to manorial court jurisdiction (and only rarely could they be appealed to royal courts):
- Thus: the decline and final erosion of serfdom, which had tied such peasant tenancies to their holdings (thus virtually guaranteeing them security of tenure), had meant either a loss of serious weakening of their property rights.
- While a few copyholders were able to secure unlimited and untrammelled rights of inheritance, most were limited to one, two, or at most three lives (i.e., generations who could succeed by inheritance to the holding).
- In some English counties, manorial customs dictated that a 'life' was only seven years, and that the maximum tenure of 'three lives' was thus only 21 years.
- When the last 'life' had expired, the contract was therefore terminated, allowing the landlord to enclose.
- A small minority were only 'copyholders at will' and could easily be dispossessed by the lord.
- Landlords also had the right to impose inheritance duties called 'entry fines': and when these fines were not specified in their amounts in manorial court rolls, landlords could arbitrarily raise the fines to excessive levels and thus force non-paying tenants off their lands.

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[14] The formal definition of copyholder is: 'tenure by copy of the court roll according to the custom of the manor'.

- Some landlords were able to buy out peasant tenants from any of these groups.
- as we shall see, in the second term, in comparing French peasants with English peasants, we will find that French peasants paradoxically enjoyed far more secure property rights than did English peasants, from the 15th century
- Conversely, therefore, English landlords, from the 15th century, were far better able to enclose their lands – i.e., to dispossess those tenants who were copyholders – than were French landlords.[15]

(4) **Cottagers:** were a relatively large amorphous class of those engaged in medieval and early-modern agriculture, perhaps 20% - 25% of the total:

- technically they were tenants, and generally free tenants, who held a few strips in the arable open fields,
- with rights of access to the village Commons grazing lands for whatever livestock they possessed.
- But most they were wage-earning agricultural labourers, who depended on these wages, especially at harvest and sewing seasons, to survive; and perhaps as well with supplementary industrial employment. and perhaps as well with supplementary industrial employment.
- few, however, could survive by their tenancy holdings alone.
- they had few rights to their holdings, few rights in the village, and thus they were the easiest to dispossess;
- and denial of access to grazing rights on the Commons was often sufficient to force them to sell or give up their tenancy rights to strips in the open-field arable.

4. <u>The Agrarian Recession of ca. 1660-1750 and Innovations:</u>

a) **An Agrarian Revolution During Agrarian Recession?**

I) **In the current economic history literature,** the predominant view, if by no means the only view, is that the century preceding the Industrial Revolution, from c. 1660 to c.1760, marked the most important period of agrarian changes:

(1) an era that helped create an Agricultural Revolution to help pave the way for the 18th century Industrial Revolution.

(2) thus once again, as in the commercial sector, we see the 1660s as a crucial turning point in modern British economic history.

ii) **The key thesis:** that this era experienced an agrarian recession, especially in grain-oriented agriculture,

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[15] This will be explored in more depth in the second term lecture on French agriculture, no. 18. But you may also now consult the related online lecture in ECO 301Y: lecture no. 19 (3 February 2010).

with falling prices,

(1) which provided the key incentive to reorganize agriculture more productively and profitably,

(2) in particular by diversifying agriculture away from grain farming

(3) especially using a system of mixed farming called convertible husbandry (to be explained)

iii) **Price Movements during the Agrarian Recession, 1660 - 1740**: we mus now examine the changes or movements of agricultural prices, in terms of:

(1) the price level itself: i.e., in terms of the consumer price index

(2) and changes in individual prices: the relative prices for grain and livestock products

b) **The Macro-economics of changes in the general price level (Consumer Price Index)**

I) **General Deflation: monetary and other causes**

(1) This period, from ca. 1660 to the 1740s, was generally one of deflation, of generally falling prices;

(2) but one in which grain prices fell more than did the general price level (see graph).

(3) As noted in previous lectures, this era experienced an overall monetary contraction

- with a much reduced inflow of precious metals from Spanish America
- and with an increased silver outflow in trade with Asia and the Baltic; and

(4) Europe also experienced, at the same time, a demographic decline, which may have curbed the income velocity of money (if you want to maintain a purely monetary explanation).

ii) **General Deflation: why a problem: in creating a price-cost squeeze for farmers**

(1) chief problem: deflation tends to increase the real cost of factor inputs, in terms of labour, capital and land, because those costs tend to remain fixed (in nominal terms), while other prices fall:[16]

- labour: with the prevalence of nominal wage stickiness, known as the 'rachet effect' so that money wages do not fall when other prices do fall (true from the 1370s to about 1920)
- interest: interest rates are set by contractual agreements, so that nominal interest rates, and thus the annual money payments for interest, do not decline, even when other prices do

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[16] For an earlier period, but with a theoretical model valid for this era, see: John Munro, 'Wage Stickiness, Monetary Changes, and Real Incomes in Late-Medieval England and the Low Countries, 1300 - 1500: Did Money Matter?' *Research in Economic History*, 21 (2003), 185 - 297. In south-east England, from 1661-65 to 1731-35, the money wage for labourers actually rose from 12d per day (nominal wage index = 300) to 15.50d per day (nominal wage index = 380), while the Consumer Price Index fell from 672.970 to 539.985 (with the base 100 = mean of prices and wages for 1451-75). See Henry Phelps Brown and Sheila Hopkins, 'Seven Centuries of the Prices of Consumables, Compared with Builders' Wage Rates', *Economica*, 23 (November 1956): reprinted in E.M. Carus-Wilson, ed., *Essays in Economic History*, 3 vols. (London, 1954-62), II, 168-78, 179-96, and in E.H. Phelps Brown and Sheila V. Hopkins, *A Perspective of Wages and Prices* (London, 1981).

- rent: similarly, rent payments for the use of land are set by leasehold contracts, so that annual rent payments may remain fixed, for ten, twenty, or 99 years

(2) Thus the landlord and farmer found, during such periods of deflation, that their factor costs of productions were rising, in real terms, while real grain prices were falling.

(3) And thus a major component of the price-cost squeeze facing landlords and their tenants who were producing grain.

(4) Hence the incentive to engage in technological innovations to reduce factor costs of production (to use at least land and labour more economically)

c) **The Micro-economics of changes in relative prices**

I) **The Disproportionate Fall in Grain Prices**:

(1) from the 1660s to the 1740s, generally

(2) with the important exception the 1690s, which were unusual years combining both wartime disruptions and bad harvests.

(3) As the graph on the screen shows, grain prices reached their lowest point during the period 1730-50, thus on the eve of Industrial Revolution.

ii) **Livestock Prices during the Recession:** But, as the same graph illustrates, livestock prices and prices for non-grain arable crops fared relatively better, i.e., by enjoying an increase in at least their relative prices.

iii) **Explanation of the Changes in Relative Prices**:

(1) **The fall in grain prices:** the essential problem was that grain production had grown much faster than demand over the 17th century;

(2) **and a relative contraction in the demand for traditional grains (rye, wheat, and barley):** reflects the following two changing circumstances: involving aggregate demand and aggregate market supply of grains

iv) **the Microeconomics of demand for and supply of grain**

(1) **population stagnation and decline**:

- even the two leading economic regions, the Netherlands and England, lost some population;
- that demographic decline was much worse in the principal continental European grain markets, thus seriously hurting the Dutch grain trade.

(2) **Increased supplies of grain placed on West European markets:**

(3) **Product substitution**:

- competition from new sources of carbohydrates in Europe,
- especially potatoes, corn (maize), and rice.

v) **As evidence for a continued growth in grain production,** we find that England itself had become a major net exporter of grain from later 17th century (perhaps as a consequence of prior enclosures), as the tables on the screen show:

The Baltic and English Grain Export Trades

Average Annual Exports in Quarters (of 8 bushels)*

1600-49 to 1700-49

PERIOD	BALTIC**	ENGLAND	TOTAL
1600-59	719,250	?	?
1650-99	585,900	26,250	612,150
1700-49	325,500	453,600	779,100

* 1 Quarter = 8 bushels = 64 gallons of grain = 480 lb. (1 bu. = 60 lb.; 6 x 80 = 480 lb.)

* about 80% on the seaborne Baltic grain exports, on average, was carried in Dutch ships (a higher proportion in the earlier than in the later periods).

Average Annual English Grain Exports

in Quarters (of 8 bushels), 1700-09 to 1760-69

Decade	Grain Exports in Quarters
1700-09	283,000
1710-19	369,000
1720-29	426,000
1730-39	531,000
1740-49	661,000
1750-59	655,000
1760-69	746,000

(1) Thus a shift in supply schedule along an inelastic demand schedule produced a sharp fall in grain prices.
(2) When demand then fell, thereby shifting the demand schedule (down) along that new supply schedule, grain prices again fell again sharply.
(3) Note two crucial historical facts:

- land does not fall out of production easily in response to falling prices;
- and indeed many farmers sought to recoup losses from lower prices by expanding their grain sales.

vi) **More Favourable Prices for Livestock products and non-grain crops:** their prices fared better, with greater elasticity of both demand and supply for these commodities:
(1) As grain prices fell, as bread became cheaper, more income was liberated to be spent on more butter, cheese, meat, poultry, eggs, vegetables, textiles, etc. thus increasing demand for these goods.
(2) Much easier to expand supply of these products without facing steeply rising marginal costs, more so than in grain farming.
(3) That was especially true of non-grain crops, which constituted a much smaller proportion of the agricultural sector.

(4) **Livestock utilization**: was much more elastic in use.

- Rather than being consumed and utilized for meat, bone, and leather, livestock herds, as stressed so often before, can be retained for haulage (power) and manure;
- i.e., their slaughter for the above-listed consumption purposes can be postponed.

d) **Major Economic Consequences of the Recession in English Grain Farming**: to promote technological innovations

I) **Relative Price Changes: encouraged English farmers to shift out of grains and into other crops and livestock products with more favourable prices**.

ii) **That in turn promoted new types of farming,** which proved to be more productive -- raising productivity through:

(1) multiple crop-rotations schemes, with more complex, and higher-fertility cultivation techniques.

(2) 'convertible husbandry': as a new way of combining and mixing arable and livestock farming.

e) **Multiple-Crop Rotation Schemes:** designed to provide

I) **greater crop diversification while also reducing or eliminating the need for fallow lands:**

(1) i.e., to use most or all the land as intensively as possible),

(2) by using leguminous and industrial crops.

ii) **involving four, five or up to seven different crops in annual rotations,** by using manure and many nitrogen fixing crops; and optimally without any need for fallow.

iii) **The new crops grown under these schemes were not really new:**

(1) they had been widely used long before in the Low Countries;

(2) but they had come to assume a far greater dispersion and far greater importance in English agriculture from the 17th century.

iv) **The industrial crops were:**

(1) flax (for linen), rapeseed and coleseed for industrial oils, and various dye plants in particular.

(2) They also provided fodder for livestock, from their stocks and leaves.

v) **The leguminous crops were those that fixed nitrogen,** the principal fertilizing agent, into the soil: chiefly, in this period, clover, sainfoin, and alfalfa (lucerne) grasses.

(1) They were far more powerful nitrogen-fixing agents than were the traditional legumes or pulses, i.e., peas and beans, as this table suggests: in kg of nitrogen per hectare (2.47 acres)

pulses (beans, peas):	30 kg.
clover:	100 kg.
sainfoin:	170 kg.

alfalfa (lucerne): 225 kg.

(2) As indicated earlier, these crops absorbed a great deal of nitrogen from the atmosphere, which was then consumed by parasitic bacteria feeding on their root systems;

(3) These bacteria converted the nitrogen into various compounds (with oxygen and carbon), which they infused into the soil through their death and decay.

(4) Note that nitrogen forms the most important element in chemical fertilizers.

vi) **Turnips**: and the Norfolk system.

(1) this was another new and very important crop grown.

(2) **Viscount Charles Townshend of Rainham (1675-1738)**: an aristocrat popularly known as 'Turnip Townshend', is very important for popularizing the use of turnips especially in the so-called Norfolk System of Four-Course Rotations, on his enclosed estates. [17]

(3) Although the turnip was not a leguminous crop, it was still very advantageous:

- especially in its role as a primary fodder crop;
- and thus it facilitated soil fertility through the extra livestock manure created (especially from stall-fed livestock).
- The cultivation methods, with roe planting and hoeing, could smother weeds, while providing also better soil aeration;
- and its much deeper roots improved soil structure, while taking nutrients out of much deeper, untapped layers of the soil.

(4) Rotated with grain crops, turnips helped to curb various plant diseases afflicting grain crops, thus preventing soil contamination.

vii) **In general crop diversification promoted better fertility:** in that the different root systems operated at different levels of soil, taking different minerals out of the soil.

e) **The Adoption and Diffusion of Convertible Husbandry:**

I) **Convertible Husbandry:**

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[17] From Answers.com: 'Townshend, Charles Townshend, 2nd Viscount (1675-1738). Townshend succeeded to his peerage in 1687. He became a Whig, specializing in foreign affairs. In 1713 he married Robert Walpole's sister and the following year became secretary of state for the northern department. Shifted to the less powerful post of lord-lieutenant of Ireland in 1717, he resigned from the government along with Walpole and remained in opposition during the Whig schism until 1720 when he became lord president of the council, returning to the northern department the following year. From 1722 he and Walpole ran the administration. Disagreement over foreign policy led to his resignation from the ministry in 1730. In retirement he devoted himself to agriculture on his estate at Rainham, and has come down to posterity as 'Turnip Townshend'.

(1) is essentially an integration of pasture and arable agriculture by alternating land use between arable and pasture over a cycle of years.

(2) Traditional open field farming, in contrast, had meant a *permanent* division between arable and pasture (even if livestock did graze on post-harvest arable lands).

ii) **It is often called 'up and down husbandry'**: why?

(1) because for, say, five years

- the farmer ploughs **up** the pasture lands for arable, and
- for next five years he puts the arable (crop) lands **down** to grass, for livestock grazing.

(2) Thus about half the land was in pasture, for livestock, and the other half was in arable fields, for a wide variety of crops: grains and many others;

(3) and after five years, the two fields are switched so that

- the well manured pasture lands are ploughed for arable, and
- the well-ploughed and cultivated arable become grasslands for livestock

Table 5. Convertible husbandry ('up and down' farming)

SECTION I: PASTURE LANDS FOR GRAZING LIVESTOCK
1) **These lands, comprising about half of the farm holdings, are 'laid down to grass' for about five years,** for pasturing livestock (sheep and/or cattle), allowing these lands to regain their fertility and store up large stocks of nitrogen. If the livestock are also 'stall-fed' -- i.e., from fodder crops outside the pasture -- their manure will add net amounts of nitrogen compounds to the soil 2) **After five or so years, these pasture lands are 'ploughed up for arable',** to follow the five-course crop system indicated below for Section II (the other half of the farm holdings). After another five years, these lands, now arable, are again 'laid down to grass' to serve as pasture lands for the following five years.
SECTION II: THE ARABLE FIELDS (with no fallow): comprising the other half.
ARABLE FIELD A: WINTER GRAINS: Wheat and/or Rye grains

ARABLE FIELD B:	THE NEW LEGUMES: Clover, Alfalfa (Lucerne), and Sainfoin grasses (high nitrogen-fixing properties), also cultivated as animal fodder crops
ARABLE FIELD C:	PULSES: Beans and Peas (low in nitrogen-fixing properties, for human and animal consumption)
ARABLE FIELD D:	SUMMER GRAINS: Barley (for beer) and Oats (to feed both humans and horses)
ARABLE FIELD E:	OTHER NEW CROPS: Coleseed and Rapeseed (for both industrial oils and animal fodder); or Turnips (chiefly for animal fodder)

iii) **During the five-years that half that land in arable,** under crops, a very intensive crop rotation system would be used, in the manner just noted, to eliminate the fallow.

iv) **Arable productivity rose with this system itself,** even apart from multiple-course crop rotations:

(1) primarily because the five years or so of livestock grazing, manuring (after being fed on forage crops as well),

(2) and natural resting made these lands so much more fertile for the succession of arable crops over the next five years.

(3) Perhaps the key feature was in providing the soil with a prolonged rest after growing grains, which are the crops that sap the most nutrients out of the soil.

v) **As already noted, many of the new leguminous and fodder crops would provide additional livestock fodder for winter feeding,** thus increasing amount of year-round manure for fields.

vi) **That combination of intensive manuring and nitrogen fixing crops:** permitted farmers to reduce drastically and even eliminate the fallow.

vii) **The biggest single and initial gain:**

(1) came from releasing large amounts of stored up nitrogen in the soils of those land long under permanent pasture.

(2) But after several years, those initial high gains in productivity would be dissipated as:

- the nitrogen levels fell; and
- as soils became more and more acid with decay of organic materials and with soil leaching, especially with improper drainage.

(3) That excess soil acidity impedes bacterial action in breaking down manure and also crop absorption of

nutrients from the soil.

(4) Unless the farmer could then add lime, as an anti-acid alkali, he might subsequently be forced to give up this form of convertible husbandry.

viii) **Livestock productivity also increased under this system**:

(1) proper ratio of livestock to land: to prevent overgrazing that became a common problem with open-field agriculture, harming soil and livestock.

(2) pasture lands were better maintained with better grasses:

- especially by cultivating strips of pasture lands with artificial grasses,
- which not only fed livestock better but also fixed nitrogen in the soil.

(3) livestock were also fed from extra fodder crops grown in arable,

- providing winter-feed (i.e., stall-feeding in protected sheds),
- making it unnecessary to slaughter part of the herd in December (which had been a common medieval practice).

(4) selective breeding: i.e.,

- with enclosed pasture lands under single management, necessary for convertible husbandry, the farmer (whether tenant or landlord) could practise selective breeding of livestock,
- which was difficult to achieve in peasant farming with communally grazed livestock: i.e., it communal grazing meant the intermixing of peasant livestock, when segregation (of rams or bulls) was necessary for selective breeding.

g) **The Transition to Norfolk Four-Course Crop Rotations:**

I) **The Norfolk Crop Rotations** evidently developed much later than did convertible husbandry, from the later 17th century.

ii) **As noted earlier, Viscount Charles Townshend of Rainham,** more popularly known as 'Turnip Townshend' is important for popularizing the use of turnips especially in the so-called Norfolk System of Four-Course Rotations, on his enclosed estates:

iii) **These crop rotations involved** alternate cycles of clover and turnips crops rotated between cycles of winter and summer grains: thus **Winter Grains (Wheat and Rye) + Clover + Summer Grains (Oats and Barley) + Turnips.**

iv) **Consider the model, in the graph,** with a transition from Farm Types A to B to C:

(1) **Farm A**: traditional farming with a three-course crop rotation, the fallow, and a permanent division between arable fields and pasture lands in permanent grass.

(2) **Farm B**: initial transition to the Norfolk Rotation scheme, by planting turnips and clover, in alternate

rotations with grains,

- i.e., alternating between the winter grains (wheat and rye) and the summer grains (barley and oats).
- In this stage, turnip and clover cultivation succeed in eliminating the fallow, while the system still retains some permanent grassland for livestock pasture, which is kept to minimize any risk from failures in growing fodder crops.

(3) **Farm C**: full realization of the Norfolk Rotation,

- eliminating both fallow land and permanent pasture.
- as you can see from the graph, the arable cultivation of both grain crops and the turnip + clover and other leguminous crops has expanded at the expense of former grazing lands increasing the output of both.

v) **Livestock are maintained under this non-pasture system totally by stall feeding,** from growing more fodder crops:

The Physical Impact of Norfolk Rotations

Farm Type	Grain Yields bu/acre	Grain Output in Bushels	Livestock Output (Bushels)	TOTAL OUTPUT IN BUSHELS	Percentage in Grain
A	11.5	460	400	860	53%
B	21.4 (23.9)	642 (717)	950 (950)	1,492 (1,567)	43% 46%
C	16.0 (18.5)	800 (925)	750 (750)	1,550 (1,675)	52% 55%

Notes:

(1) Livestock figures are expressed in terms of equivalent outputs measured in terms of bushels of grain, for comparisons.

(2) The figures in parentheses indicate productivity gains from better pest and disease control in adopting the new rotations.

vi) **Some agrarian historians, most recently Mark Overton,** contend that this Norfolk rotation scheme was far more widely diffused and thus far important than convertible husbandry in raising crop yields and

livestock productivity in early-modern and modern England.[18]

vii) **I myself have rather strong doubts on this,**

(1) I doubt in particular that the pure Norfolk system was ever widely used;

(2) for almost all the evidence that I have seen indicates that English livestock farming always involved at least some pasture (grazing) lands.

h) **Floating Water Meadows: a New Method of Irrigation** (from late 16th century): [19]

I) **For those with farmlands having streams running through or nearby them,**

(1) this system could vastly increase their soil productivity, constructing a system of irrigation canals and pipelines to flood meadow lands or arable lands from the late Fall to early Spring.

(2) In winter, the irrigation canals would be closed, and water left to drain off.

ii) **Purpose of Floating Water Meadows was three-fold**:

(1) **moisture: to provide sufficient moisture** for soil in ensuing summer

(2) **soil fertility**: to provide soil with a rich layer of river silt (alluvial)

(3) **insulation, the most important aspect**: to provide a protective layer of water, underneath a possible layer of ice, to protect the soil and germinating crops from freezing: i.e., a thermal blanket of water.

(4) That permitted grasses and spring crops to germinate about a month earlier than on unprotected lands and to produce a much richer crop.

iii) **Obviously only capital-rich landlords with enclosed estates**: could invest in and implement such floating water meadows.

(I) **Other Improved Techniques (not necessarily new)**:

I) **Marling**:

(1) applying a mixture of clay with lime carbonate,

(2) serving both as a fertilizer and as an agent giving greater body to sandy soils,

(3) to retain both moisture and humus.

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[18] Mark Overton, 'Re-establishing the English Agricultural Revolution', *Agricultural History Review*, 44:1 (1996), 1-20; Mark Overton, *Agricultural Revolution in England: The Transformation of the Agrarian Economy, 1500 - 1800*, Cambridge Studies in Historical Geography (Cambridge, 1996).

[19] Invented by Roland Vaughan, in 1589-90, in Herefordshire. It had become widespread in this region by the 1650s. See Eric Kerridge, *The Agricultural Revolution* (London, 1967); Eric Kerridge, *The Farmers of Old England* (London: George Allen and Unwin, 1973), pp. 110-15; G. G. Bowie, 'Watermeadows in Wessex: A Re-evaluation for the Period 1640 - 1850', *Agricultural History Review*, 35 (1987), 151-58; Susanna Wade Martins and Tom Williamson, 'Floated Water-Meadows in Norfolk: A Misplaced Innovation', *Agricultural History Review*, 42:I (1994), 20 - 37, demonstrating that only certain areas of England could utilize this very costly innovation.

ii) **Chalking or Liming**:

(1) used for the opposite reason on heavy clay soils,

(2) to combat soil acidity, to break down these soils, to provide finer texture,

(3) and to permit better drainage, especially in clay soils of Central and Eastern Midlands.

j) **Importance of Enclosure for These New Techniques**:

I) **Obviously enclosures, with single management of farm land,** made it far easier to design and to effect these drastic changes

(1) in the agrarian regime: single person to decide on crop selections and crop rotations

(2) and in the division between arable and pasture;

(3) or indeed in the much more drastic elimination of permanent pasture.

ii) **For convertible husbandry in particular, large-scale consolidated farming units were certainly necessary**: with large consolidated tracts for both arable and pasture farming.

iii) **Capital requirements**:

(1) The New Husbandry acquired access to very large and relatively cheap capitals, for undertaking these changes:

- capital to convert open-field lands to convertible or 'up and down' husbandry: which might require ten years to put into place.
- capital for additional livestock, capital for irrigation systems of floating meadows;

(2) **The issue of mortgages (again):** Land owners and their tenants, with now unified control over enclosed estates, found it much easier, as argued earlier, to mortgage their farms to acquire capital, using the land as collateral, than did small farmers with Open-Field tenancy strips.[20]

iv) **Were these more advanced techniques to be found in Open Field Farming?**

(1) The answer is that, yes, occasionally some of these techniques may have been found in Open Fields, especially multiple course rotations.[21]

(2) Robert Allen has been most insistent that open-field farmers were just as progressive as estate farmers; but -

(3) **Open Field farmers were rarely if ever the true innovators:** they would finally collectively agree to adopt these techniques long after they had proved to be successful elsewhere, and relatively risk-free; i.e.,

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[20] See n. 4 above (citing the article by Pat Hudson).

[21] See M.A. Havinden, 'Agricultural Progress in Open-Field Oxfordshire', *Agricultural History Review*, 9 (1961), 73-83.

diffusion into Open Field Farming was very slow.

(4) Many of those who adopted such techniques in Open Field farming had already engrossed large holdings, without yet having withdrawn them from the communal rotations.

iv) **Why Enclosures were more suitable for Convertible Husbandry than were Open Fields**

(1) As noted earlier, such very major changes would have required the common consent of all the villagers (or at least of the powerful leading families): most difficult to obtain

(2) The key feature of convertible husbandry was the complete alternation in the use of farmlands between arable and pasture (and back) over a ten year period (five per cycle)

(3) that would would have meant the obliteration of the existing lay-out and distribution of tenancy strips in the arable (though some visible signs of the plough strips would remain)

(4) Much more problematic: how would the Common Field villagers reassign the new strips created by converting former pasture lands into the new arable?

- that surely would have been almost impossible
- all the more so, combined with the same problem in the next cycle, when the former arable, now pasture, was converted back once more to arable

(5) Obviously such alterations in land use would be far, far easier with enclosure and unified, single management, with any necessity to consult anyone else.

(6) Another consideration concerning landlords' arable lands

- in many cases, we find that the landlords' own domain holdings, also in the form of plough strips, had been interspersed with those of their tenants.[22]
- probable reason: over the centuries (from the late 14th century), many landlords had leased out portions of their domain to their peasant tenants, and thus in a form that meant such intermingling and scattering of strips.
- the lords benefited from the communal ploughing, including their own lands
- but once landlords decided to engage in market-oriented commercial farming, with the New Husbandry, they obviously had to get rid of the tenants whose holdings were intermingled with their own.

k) **Economic advantages of the new farming systems during the later 17th and 18th centuries**:

I) **provided the farmer with much greater income stability by increased diversification,**

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[22] See R. H. Tawney, *The Agrarian Problem in the Sixteenth Century* (London: Longmans Green, 1912; reissued with and introduction by Lawrence Stone: New York and London: Harper Torchbooks, 1967), Maps I - VI, between pp. 166-67.

(1) by balancing livestock and arable, with wide variety of crops.

(2) In particular, provided a better economic balance between grain, with falling prices, and livestock products, with rising or more stable prices.

ii) **permitted better and year-round feeding of livestock:**

(1) by a combination of better grassed pastures and

(2) improved via stall-feeding (principally the latter, if true Norfolk farming)..

iii) **permitted better livestock management:**

(1) through selective breeding and disease control

(2) both of which, note, were difficult to achieve with intermingled flocks of common-field farmers.

(3) indeed how could selective breeding take place when the villagers' livestock intermingled together while grazing?

iv) **Famines: ended with the spread of Convertible Husbandry (and Norfolk Farming):** i.e., threat of famine eliminated from the productivity and nutritional gains from the New Husbandry

(1) by so varying outputs throughout the year, with a much more widely diversified crop and livestock 'portfolio', so to speak.

(2) while famine remained a constant threat to the French peasantry up to the 1789 Revolution.[23]

v) **Increased agricultural productivity: dealing with the 'price-cost' squeeze that resulted from**:

- general deflation, when factor costs (wages, interest, rents) did not fall, especially those fixed by longer-term contracts, while agricultural prices did;
- and indeed nominal wages were rising in this era
- the disproportionate fall in grain prices, for those heavily invested in grain-oriented agriculture.

(1) the increased output per man and per acre that resulted from switching to New Husbandry permitted at least some farmers to cope more effectively with the price-cost squeeze.

(2) At the same time, obviously, a collective tendency to increase productivity and output would itself have aggravated the price fall.

(3) perhaps the continued fall in grain prices suggests that the convertible husbandry was losing ground to the Norfolk rotations, which had a greater emphasis on grain production and higher yields.

(4) But not all grain farmers were able to respond in this fashion:

- certainly there was still no marked shift away from grain farming;
- if so, grain prices would not have fallen so steeply.

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[23] See Andrew Appleby, 'Grain Prices and Subsistence Crises in England and France, 1590-1740', *Journal of Economic History*, 39 (1979), 865-88.

(5) So many of the small grain farmers were victims, and the chief victims, of this prolonged agrarian recession:

- in lacking capital and/or suitable soils,
- and the flexibility of enclosures to switch to a much diversified, more livestock oriented mixed husbandry (or into, say, specialized dairy farming).

5. **Socio-economic consequences of the agrarian recession**: **Land consolidation by the upper gentry and aristocracy.**

a) **The Decline of the Small Yeomen Farmers**:

i) This very period, 1660 to 1740, was the one in which the English yeomanry or small freehold farmers, along with some lesser gentry, suffered the greatest contraction in their overall landholdings (i.e., more so than in the 19th century).

ii) But curiously Robert Allen refers to this era as one of a 'yeomen revolution' in farming.

iii) most victims were primarily grain farmers who were unable to adopt the new farming methods.

b) **The economic plight of the small yeomen farmers:** during the agrarian recession

I) victims of a worsening price-cost squeeze, especially if they were primarily grain-farmers:

(1) steady fall in grain prices (except in the 1690s): for reasons already demonstrated fully

(2) rising input costs that were essentially the results of price deflation:

- deflation usually increases real factor or input costs, simply because of factor-price stickiness
- thus, nominal wages for farm labourers, landlord rents for tenancy holdings, and interest rates for capital in livestock and equipment remained fixed, while nominal commodity prices fell – the prices of their farm outputs (with deflation).
- thus, as a consequence, *real* factor prices (as opposed to nominal prices and costs) rose

(3) The shift to convertible husbandry and/or Norfolk farming (aka: the New Husbandry) has been shown (last day) to have been a solution for this cost-price squeeze, in two respects:

- a shift out of grain into other arable crops and especially into livestock products whose prices either fell less than did grain prices, or sometimes even rose; and were more profitable
- the far greater efficiency, the much greater arable productivity from the New Husbandry had the effect or reducing farming costs per acre and per unit of manpower: to reduce the cost squeeze

(4) Problems of the New Husbandry for small, yeomen farmers: capital requirements

- the New Husbandry was far more capital intensive than was traditional farming, especially by involving a much greater livestock component (chief form of capital)

- high capital costs were also involved in converting land to the New Husbandry, especially by involving enclosures, which were initially capital-costly
- but most small farmers (and even poor gentry) had inadequate supplies of capital and, worse, had little or inferior access to capital (i.e., gaining more capital), for reasons to be shown

(5) Thus more and more small, yeomen farmers had only one other option in dealing with falling grain prices and the price-costs squeeze: to sell their holdings

c) **Many freeholders were forced to sell out: chiefly to the wealthy upper gentry and aristocracy,** thus leading to a much greater land consolidation.

d) **copy-holder tenants who held their lands for 'lives'--** for one, two, or three generations -- were also forced out, as landlords either

I) bought up their copyhold rights (often forcing the tenants to sell out)

ii) or refused to renew the copyholds when they finally expired.

e) **Resurgence of the Great Landowners and the Aristocracy, 1660-1740**:

I) i.e., in the period following the restoration of the English monarchy in 1660 (with the return of Charles II, ending the Republican-civil war era).

ii) In contrast, the previous era of major enclosures, during the so-called Price Revolution era of the 16th and early 17th century, had involved a large transfer of land from the Church, the Crown, and the upper aristocracy to the lower, untitled social aristocracy, known as the 'gentry,

iii) But, the ensuing era, the post-Civil War and Restoration era from the 1660s marked the mirror-image reverse, in social and economic terms:

iv) It marked the revival and resurgence of the great land-holding aristocracy: a post-Restoration aristocracy that became a revitalized landholding social class

- by now including many former members of the gentry, elevated to the peerage after 1660
- who had acquired noble titles (by purchase or by royal reward for services).

f) **Introduction of Entail Settlements**: a legal manoeuvre that helped aristocrats and great landowners.[24]

I) In essence, the application of legal provisions for inheritance known as **entail law** to an estate prevented its subdivision and parcelling through inheritance or forced sales,

- i.e., it prevented alienation of landed capital: inherited land could not be subdivided;
- only lands purchased separately could be alienated: i.e., sold or traded.

ii) Peter Mathias and other historians have argued that having an entailed estate allowed the landowner a great

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[24] On this topic, read especially: Peter Mathias, *The First Industrial Nation: An Economic History of Britain, 1700 - 1914*, 2nd revised edn. (London 1983), pp. 55-56.

advantage in borrowing:

- i.e., to obtain mortgages on much lower rates of interest, because of the very low risk that the estate would be broken up, thereby undermining its value.
- If the borrower defaulted on his mortgage: mortgage-holder have right to the income but not to the land.

iii) This allowed those great landowners with such entail provisions and thus the capital resources:

- to buy up smallholders and copyholders,
- to engage in enclosures,
- to adopt much more capital intensive farming methods,
- and thus weather storms of the agricultural recession so much better than others.

g) **'Equity of Redemption'**:

I) a financial innovation from the early 17th century that made mortgages on landed estates both negotiable and transferable

ii) and similarly made it possible for mortgages, or debts contracted on the security of land, to be left outstanding permanently.

iii) Lenders who wanted to recoup their capital invested in a mortgage, instead of dealing with the mortgagee, could sell these mortgages to third parties, who thus became the new creditors, receiving the monthly mortgage payments.

iv) The modern equivalent of this financial instrument is the securitised mortgage: widespread in the US (and a major factor in the recent financial crisis of 2008-2009), but rare in Canada

v) **Key point again:** 'equity of redemption' allowed big landowners to borrow large sums without having to worry about paying off their mortgages, i.e., their landed debts.

h) **More Capital Intensive Farming:**

I) With both this financial institution of 'equity of redemption' and with those entailed estates enjoying large and cheap mortgages,

ii) the large landowners, especially the aristocratic ones, had far more capital and much easier access to cheaper capital,

iii) and were better able to engage in more capital intensive farming

iv) As already argued, the more complex forms of mixed husbandry:

- whether convertible husbandry or Norfolk rotations, or involving floating meadows were far more capital intensive,
- and so offered the best prospects of riding out this prolonged agrarian recession.

v) Contrary to traditional literature, this era also marked a very considerable amount of enclosures, principally by large landowners.[25]

vi) Facilitating all of thus was a general fall in nominal (if not real) interest rates from the 1690s to the 1750s, whose reasons we shall examine more fully in the subsequent topic on Banking and Finance.

vii) During this period, and beyond into the early 19th century this process of land-amalgamation, creating much larger sized farms, continued,

- particularly through the agency of enclosures,
- ultimately creating a three-tier agricultural system: of great landlords, prosperous tenant farmers with large leaseholds, and poor agricultural workers.

6. The Completion of the Enclosure Movement in England, 1750 - 1830

a) **Completion of the Enclosure Movement and Agrarian Changes:**

I) **The final and, according to some historians, arguably the most important period of Enclosure was the one that directly accompanied the Industrial Revolution,** from ca. 1760 - ca. 1830, though this is certainly and very hotly disputed by my Oxford colleague (formerly at UBC) Robert Allen.[26]

ii) **By the early 18th century, according to most recent estimates,**

(1) about 70% - 75% of English agricultural land had already been enclosed, and

(2) thus about 25% - 30% remained in common or open fields (compared to about 55% in 1500),

(3) and that was subsequently enclosed, within a relatively short space of time, by the 1820s.

iii) **Parliamentary Enclosures are the most significant feature:**

(1) as landlords called upon the government to assist them in expropriating holdings of small freeholders and peasant tenants:

(2) i.e., to use the force of the law — i.e.. to exercise the government's rights and powers of *eminent domain*

- to override the still deeply entrenched property rights of the remaining tenants,
- and to expropriate the tenants' rental lands, or even their freehold lands.

(3) though always, it must be noted, with some government administered compensation.

iv) **Undoubtedly the Industrial Revolution itself contributed to this remaining Enclosure movement,** in the manner demonstrated on the flow chart on the screen (see web graphs).

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[25] See J.R. Wordie, 'The Chronology of English Enclosure, 1500-1914', *Economic History Review*, 2nd ser. 36:4 (November 1983), 483-505.

[26] Robert Allen, 'Tracking the Agricultural Revolution in England', *Economic History Review*, 2nd ser., 52:2 (May 1999), 209-35. See below for a discussion of this recent article.

v) **Let us now look at the more specific factors:** those that promoted the final speed-up and completion of English enclosures after 1750 to ca. 1820.

b) **The Post-1750 Enclosures: Rising Grain Prices and General Inflation**: Both together, a combination of monetary and real factors in rising prices, provided some new incentives to enclose lands for commercial farming:

I) **The Macro-economics of the rising price level: Monetary Inflation:** it is important to realize that period ca. 1750 - 1815 was one of general monetary inflation, commencing in the 1750s and 1760s:

(1) inflation developed from the 1750s, with a dramatic increase in bullion & coinage stocks:

- first thanks to an enormous Brazilian gold-mining boom from the early 18th century, reaching its peak in the mid-century, but still impressively strong to the end of the 18th century;
- and then even more especially thanks to newly developed silver mines in Mexico, with a very steep rise in aggregate output from the 1760s, as seen on the graph.

(2) But subsequently paper money and credit was a far more powerful force: inflation became much more severe during the years 1790-1815:

- years of total war, with a flood of new paper banknotes (the 'Paper Pound' era),
- as we shall see more clearly, in the next major topic, on British banking and finance during the Industrial Revolution.

ii) **the Micro-Economics of Real Price Increases (Grain):**

(1) as in previous phases of general economic and demographic expansion, grain prices rose higher than did the general price level (rose higher than did most other prices):

(2) i.e., there was a significant rise in relative or real grain prices, as the graphs on the screen show.

c) **Economic Factors promoting rises in real grain prices:**

I) **'Demographic Revolution'**: Rising population pressure on relatively fixed land resources was again (as in the 16th century) a major phenomenon:

(1) as mentioned so many times before, the population of England and Wales in this era almost doubled from about 6.3 million in 1751 to 12.3 million in 1821.

(2) Despite rising agricultural productivity and total output,

- English population growth soon outstripped domestic grain production,
- so that by the 1770s England had forever ceased being a net exporter of grains, and thus became a net importer.

ii) **Warfare and Grain Prices**:

(1) From 1792 - 1815, the French Revolutionary and Napoleonic Wars aggravated the rise in real grain prices,

(2) especially after Britain had become a net grain importer: by periodically cutting off imports of Baltic and other foreign grains.

iii) **Bad weather**: Finally, in 1790s, unusually bad weather and thus bad harvests contributed to recurrent grain shortages and soaring price of grain.

d) **Prices and Interest Rates**: **the Importance of Inflation for Enclosures**:

I) **Note again that enclosures were very capital costly**:

(1) **Substantial costs were involved**:

- in fees for Acts of Parliament to permit expropriation;
- charges for the accompanying parliamentary surveys;
- payment of compensation to tenants, or capital payments to buy out small farmers;
- capital investments in reorganizing estates, in fencing, ditching, etc.; in adding livestock, floating meadows, etc.

(2) **Rise in capital costs:** It has been estimated that the total costs of Enclosure rose more than five-fold from the 1750s to 1815: from 11 to 62 shillings per acre (partly inflationary, by 1780s).

ii) **The impact of general Inflation**,

(1) a rising general price level, we have already noted was the predominant trend from the 1760s;

(2) but nominal interest rates did not rise with the price level, did not rise to the same degree,

- which thus meant a fall in real interest rates
- N.B. **the real interest rate is:** the nominal interest rate **minus** the annual rate of inflation;
- but the graph to be shown has an erroneous construction in 'deflating' the nominal interest, dividing it by the price index [a very common error, amongst both students and academics]

iii) **Capital Costs and Inflation**:

(1) **Inflation**, thus had the effect of cheapening the real cost of capital, certainly previously borrowed capital, to repeat, by reducing the real burden of interest rates for enclosing farmer.

(2) Thus landlords found it increasingly cheaper to borrow the large amounts of capital that were necessary to engage in Enclosure, and when capital requirements were rising.

iv) **The graph on the screen indicates that the rate of post-1750 enclosures was related to changing real interest rates:** there were two periods of extensive enclosures (by parliamentary acts) surrounding one significant slack period in the 1780s.

(1) **Why the 1780s?** The 1780s were war years (American Revolutionary + European wars) when government war financing caused real interest rates to soar, while prices were rising more slowly.

(2) **Enclosures during the war-time period 1790 - 1815** (French Revolutionary and Napoleonic Wars):

- While this was certainly a period of even more costly wars and high nominal interest rates, those interest rates were effectively swamped by inflation.
- As the graph shows, real interest rates consequently *fell* during this wartime era.

e) **Ricardo Theorem on Economic Rent:** may be cited as an auxiliary economic model to help explain late 18th century Enclosures: remember that prices determine rents, not the other way around (as many people still think):[27]

I) **incentive**: for landlords to capture the growing economic rent on land, as population pressure and other real factors drove up grain prices.

ii) **incentive to engage in commercialized farming**: to produce rising profits, and so acquire increased rents on land.

iii) **the necessary capital to engage in costly enclosures** thus came partly from the increased rents and farm profits that were ultimately gained from enclosures, which allowed landlords to reorganize the land into large leaseholds with higher rentals.

iv) **Tenant Farmers and rents:**

(1) Thus such tenants could well afford to pay these higher rents, as the relative or real prices of grain and other agricultural products rose, and presumably rose above their production costs.

(2) Indeed Ricardo demonstrated, in this very era (early 19th century), that agricultural prices determined the land rents, and not the other way around.

f) **The Nature and Forms of Enclosure after 1750:**

I) **Parliamentary Enclosures:**

(1) The main feature of post-1750 enclosures was the increasing resort to Parliament for private acts to permit expropriations for enclosure:

(2) i.e., those remaining lands of peasant resistance whose copyhold inheritance or freehold rights were so strong that they could not be dislodged by traditional means;

(3) thus landlords needed government authorization to seize or expropriate communal ands

(4) government expropriation of both communal and private property is known as *eminent domain*

- as noted earlier, *eminent domain* was an ancient historic right, though it had usually been confined to expropriations for public use – the general benefit of the public
- but *eminent domain* has been used to transfer private property from one owner to another, if the transfer has been deemed to be a public benefit

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[27] See the document on Ricardian economic rent, on my Home Page, and especially the graph, at: http://www.economics.utoronto.ca/munro5/ECONRENT.pdf

- whatever the nature and forms of such state-sanctioned expropriations, an equally inherent principle has been that it be accompanied by fair compensation to the dispossessed

(5) and thus, as emphasized earlier, these Enclosure Acts always provided compensation given to the displaced tenants

(6) but whether the compensation was fully just is another, and very debatable question.

ii) **While the total acreage under these Parliamentary Enclosure acts might suggest that almost half of English arable lands were enclosed after 1750,**

(1) many of these acts merely formalized and ratified previously illegal enclosures,

(2) so that the net amount enclosed after 1750 is probably closer to 25% or 30%.

The Relationship between Wheat Prices and Parliamentary Enclosures

Decade	**Index of Average Wheat Prices: Mean of 1700-9 =100**	**Number of Parliamentary Enclosure Bills per Decade**
1720-30	101	25
1730-40	87	39
1740-50	84	36
1750-60	103	137
1760-70	113	385
1770-80	132	660
1790-1800	175	469
1800-10	241	847
1810-20	265	853
1820-30	174	220

Estimates of Acreage Enclosed by Acts of Parliament, 1760 - 1844 (3883 acts)

Period	**Commons Enclosed in Acres**	**Wasteland Enclosed in Acres**	**Total Acreage Enclosed by Acts of Parliament**	**Percentage of the Aggregate (1760-1844)**

1760-1800	2,439,000	752,000	3,181,000	55.5%
1800-1844	1,610,000	939,000	2,549,000	44.5%
1760-1844	**4,039,000**	**1,691,000**	**5,730,000**	**100.0%**

v) **Final Result of these Parliamentary Enclosures**:

(1) as the table shows, almost 6 million acres (5.73 million) were enclosed by these laws, almost 4,000 private acts (3,883) between 1760 and 1830: that amounts to 21% of the arable land of England.

(2) Robert Allen: has offered slightly different figures for 1700-1850, as follows:

- Open Fields and Pastures: 3,093 acts to enclose 4.487 million acres
- Wastelands, etc: 2,172 acts to enclose 2.3 million acres
- Total of 6.787 million acres of land

vi) **Private Agreements:** Some considerable amount of land was also enclosed, as before, by private agreements between landlord and tenants, but how much we really do not know.

(1) The old traditional view has been that another 8 million acres were so enclosed (thus bringing the total to over 14 million out of 24 million acres, or 58%).

(2) But J. R. Wordie, supported by other historians, believes that the amount privately enclosed was far less -- perhaps half of that amount; they suggest the ratio was 2/3 enclosed by parliamentary acts and 1/3 by private agreement (i.e., 9 million out of 24 million = 37.5% of total).[28]

viii) **Net Additions to England's Arable Lands:**

(1) Of total lands enclosed in this era, it has also been argued in the past, perhaps 10% - 20% were waste lands that thus represented a net addition to England's agricultural capacity, without any real social disruption: a net gain.

(2) For the most recent survey consider the following table by Robert Allen (1994) on increased land use:

Utilization of English-Welsh Lands, 1700 - 1850

in millions of acres

[28] See n. 13 above.

Land Type	in 1700	in 1800	in 1850	Percent Change
Arable	11.00	11.60	14.60	32.72
Pasture/Meadow	10.00	17.50	16.00	14.40
Woodlands	3.00	1.60	1.50	-50.00
Wastelands/forests	13.00	6.50	3.00	-76.92
TOTAL	38.00	38.50	37.30	-1.84
TOTAL AGRICULTURAL	34.00	35.60	33.60	-1.18
INDEX OF LAND INPUT	1.00	1.35	1.37	37.00

Source: Robert Allen, 'Agriculture During the Industrial Revolution', in Roderick Floud and Donald McCloskey, eds., *Economic History of Britain Since 1700*, Vol. I: *1700 - 1860*, 2nd edition (Cambridge, 1994), Table 5.2, p. 104.

g) **The Impact of the Industrial Revolution on Enclosures**:

- I suggested earlier that many, though by no means all, of the enclosures were in response to or were assisted by the very processes of the Industrial Revolution itself:

I) **transport**:

(1) **transportation revolutions:** was critically important in bringing large areas of arable farmland within the market economy:

- the improvement of river navigation during the first half of the 18th century,
- and its extension in the development of a canal network during the second half (1760-1800)

(2) to make commercial agriculture feasible, to encourage investment in farming.

ii) **growth of industrial towns**:

(1) urban industrialization created greatly expanded markets for agricultural products:

(2) i.e., foodstuffs in feeding a growing proletariat,

(3) and of course a wide variety of industrial raw materials, animal and vegetable.

iii) **the development of banking and credit institutions**: directly spawned by industrialization, but also used

to mobilize the necessary capital for enclosures and agricultural improvements.

6. The Agricultural Revolution: Productivity Changes and Enclosures

a) **The Debate About the 'Agricultural Revolution' and Increasing Productivity**:

I) **Exactly when the so-called 'true' agricultural revolution really began, if there was one, has pre-occupied historians now for many generations:**

(1) Was it during the 16th-century and early 17th century era of the Tudor-Stuart Enclosures?

(2) Was it instead during the later 17th century 'General Crisis' era of the agrarian recession?

(3) Did it take place instead during the Industrial Revolution era of 1760-1820?

(4) Or did it really begin only from the early the 19th century?

ii) **The current debates on changes in English agricultural productivity**: per acre (or hectare = 2.47 acres), per unit of manpower.

(1) The old traditional views, lasting for many generations, had assumed that grain agriculture had achieved only about a 10% increase -- a 10% increase in grain yields -- during the course of the 18th and early 19th century;

(2) that view was held even by those who had contended that an Agricultural Revolution had accompanied the Industrial Revolution, from 1760 to 1820.

(3) Obviously, many other historians ridiculed that traditional view,

- and argued that the true Agricultural Revolution had occurred instead a full century earlier, from 1660 to 1760,
- when they could show far higher gains in both land and labour productivity than these certainly unimpressive 10% figures for the 18th and early 19th century.

iii) **R.V. Jackson on English agricultural productivity, 1650 - 1800** (1985):[29]

(1) He uses relative price evidence to argue that the fundamental period of productivity growth in English agriculture was this prior century of 1660- 1760, and more precisely 1660 to 1740;

(2) and this very point has just been reinforced (with similar logic, formulae, and econometrics) by Robert Allen:[30]

(3) the period 1660-1740, as already noted last week, was a period of often steeply falling grain prices and

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[29] R. V. Jackson, 'Growth and Deceleration in English Agriculture, 1660 - 1790', *Economic History Review*, 2nd ser. 38 (August 1985), 333-51.

[30] See Robert Allen, 'Tracking the Agricultural Revolution in England', *Economic History Review*, 2nd ser., 52:2 (May 1999), 209-35. See n. 6 above.

also larger grain exports: for Jackson both phenomena reflect rapid productivity gains.

(4) the succeeding period, from 1740 to 1790, encompassing much of the Industrial Revolution era, was,

- in contrast, a period of rising grain prices, when England was forced to begin importing grain:
- so conversely for Jackson these data reflect very slow agricultural growth, 'perhaps even of near stagnation'.

(5) I find this a questionable reading of the statistics, by not taking into account demographic factors and the changing land:labour ratios.

- High prices in the latter era reflect both the net addition of poor quality high cost marginal lands and of wartime interruptions in English grain imports;
- but the existence of grain imports does not itself prove falling productivity on all lands.

(6) Obviously average productivity must have fallen as population growth forced into production high cost, low yielding marginal lands;

(7) but that does not mean that the *marginal productivity* of land itself fell, in terms of previously cultivated lands, presumably higher yielding lands (as in the Ricardo model).

(8) With increased rural population, and a population not yet fully displaced from agriculture, the *marginal productivity* of labour may have fallen: i.e., with surplus labour on many estates.

b) **Recent Revisionism on the 18th-Century 'Agricultural Revolution': the Conservatives' Case**

I) **Recently, however, several revisionist historians claim that by far the most impressive gains in agricultural productivity, in terms of both land and labour productivity, did in fact occur after 1750,** with gains vastly greater than those of 10%, gains that justify the term 'revolution'.

(1) Some however put forth their arguments prior to Jackson's article, which thus does not agree with their views.

(2) We will consider the revisionists views briefly in turn and then look at the debate over the role of enclosures.

ii) **Michael Turner's statistics** (*Economic History Review*, Nov. 1982): he contends that English agriculture, overall, achieved productivity gains of 77% per acre over the period 1650 to 1800, as follows:[31]

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[31] Michael Turner, 'Agricultural Productivity in England in the Eighteenth Century: Evidence from Crop Yields', *Economic History Review*, 2nd ser. 35 (1982), 389-510. See also: Michael Turner, *Enclosures in Britain, 1750 - 1830* (London, 1984), pp. 37-52; Michael Turner, 'English Open Fields and Enclosures: Retardation or Productivity Improvements?' *Journal of Economic History*, 46 (Sept. 1986), 669 - 92; Michael Turner, 'Common Property and Property in Common', *Agricultural History Review*, 42:ii (1994), 158-62; Michael E. Turner, J.V. Becket, and B. Afton, 'Taking Stock: Farms, Farm Records, and Agricultural Output in England, 1700 - 1850', *Agricultural History Review*, 44:1 (1996), 21-34.

(1) 36% for the century 1650-1750 and;

(2) a further 30% for the half century 1750-1800, peaking in the 1770s.

(3) The Post-Napoleonic War period: 1815-50: the great leap forward

- In Turner's view, the next great leap forward took place after the Napoleonic Wars,
- but more especially in the years 1830-50, supposedly with gains of up to 46%.

iii) **B. A. Holderness's Estimates for 1800 - 1850:** measuring the total output of English agriculture in all crops and livestock, valued at constant prices, for specific areas, concludes that:[32]

(1) Total Output: rose at a rate of 0.79% per annum

(2) Land Productivity (crop yields): rose 0.89% per annum

(3) Labour Productivity: man per acre: rose 0.53% per annum

(4) All these estimates are all complicated, of course, by large regional variations and by large annual fluctuations in output, which, in large part, were due to weather changes.

(5) Further complicating the debate, obviously, is the arbitrary shift in time periods compared:

- note carefully that this period is 1800-1850, with falling prices after 1815,
- and thus excluding the very debatable era of 1750-1800, with generally rising grain prices.

iv) **Campbell and Overton: research on Norfolk farming**

(1) Bruce Campbell and Mark Overton (1991) have supplied the most recent detailed agrarian research on one particular but very important region, Norfolk in East Anglia;

(2) they now offer strong support for that the older view focusing on the Industrial Revolution era.

(3) Mark Overton in both the 1991 and more recently in a 1996 article, argues specifically that the most dramatic change in crop rotations and livestock husbandry similarly came only from the 1740s: 'the major discontinuity', with a far heavier emphasis on turnips, clover, other legumes, and far greater livestock density (fed from these crops).[33]

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[32] B.A. Holderness, 'Prices, Productivity, and Output', in George Mingay, ed., *The Agrarian History of England and Wales*, Vol. VI: *1750 - 1850* (Cambridge, 1989), pp. 84-189.

[33] Mark Overton and Bruce Campbell, 'Productivity Change in European Agricultural Development', in Campbell and Overton, eds., *Land, Labour, and Livestock: Historical Studies in European Agricultural Productivity* (Manchester, 1991), p. 39. See also Figure 1.2, on p. 40 for Norfolk (rising from ca. 1740), Lincolnshire (from only ca. 1750), Hertfordshire (from ca. 1670), Hampshire (from ca. 1800 -- though no data from 1700 - 1800). See also: Bruce M.S. Campbell and Mark Overton, 'A New Perspective on Medieval and Early Modern Agriculture: Six Centuries of Norfolk Farming, c.1250 - c.1850', *Past & Present*, no. 141 (Nov. 1993), pp. 38-105; Mark Overton, *Agricultural Revolution in England: The Transformation of the Agrarian Economy, 1500 - 1800* (Cambridge and New York, 1996); Mark Overton, 'Re-establishing the English Agricultural Revolution', *Agricultural History Review*, 44:1 (1996), 1-20.

(4) Nevertheless, both implicitly concede that this dramatic growth in yields from the 1740s may represent the fruits gained from the earlier diffusion of new cropping techniques, i.e., from the 1660s.

(5) Overton regards livestock as the crucial variable (though admitting that the livestock changes date from later 17th century) – in this view, he is joined by Patrick O'Brien and many others;

(6) and that agricultural productivity rose only when arable and livestock husbandry were fully integrated, by the early to mid-18th century.

(7) Overton also argues that population growth in the later 18th and 19th centuries did not lead diminishing returns in agriculture, as most historians had believed, influenced by Malthus and Ricardo.

(8) and instead he argues that population growth provided the key spur to intensifying crop yields and improving productivity

- crop yields rose, not fell, with population growth: more intensive cultivation
- as indeed had also taken place in previous eras of population growth in Norfolk, during the 13th and then the 16th centuries

(9) That same general view on population growth had been argued earlier by a very famous development economist, Esther Boserup[34]: that demographic pressures historically have provided the key spur and incentive for agricultural innovation.

(10) Finally, both Overton and Campbell therefore agree with Michael Turner that even an greater spurt of agricultural growth occurred in the early 19th century, during the era of the most intensive increases in population:

(11) The table on the screen provides a summary of Overton's views to justify the argument that the true Agricultural Revolution accompanied the Industrial Revolution:

English Agricultural Output and Productivity

1700 = 100

	1300	**1600**	**1700**	**1750**	**1800**	**1850**
OUTPUT						
Population Method		80	100	121	159	272
Volume Method			100	127	191	285
Demand Method			100	143	172	244
AREA						

[34] Esther Boserup, *The Conditions of Economic Growth: The Economics of Agrarian Change Under Population Pressure* (Chicago, 1965).

	1300	1600	1700	1750	1800	1850
Arable Area			100		128	170
Sown Arable			100		135	199
Meadow and Pasture			100		147	103
Total Area			100		138	132
LAND PRODUCTIVITY						
By population			100		115	207
By Volume			100		138	216
Crop Productivity[a]	3.05					6.73
Livestock Productivity[a]	1.04					6.56
Wheat Yields [b]	79	72	100	123	136	180
Cereal Yields [c]	115	92	100	135	158	250
LABOUR PRODUCTIVITY						
By Population		77	100	126	141	197
By Volume of Output			100	134	170	206

a. Estimates of Gregory Clark (1993) in terms of bushels of wheat.
b. Hampshire, Herefordshire, Lincolnshire, Norfolk, Suffolk; but 1300 for Norfolk, Hampshire only.
c. For Norfolk and Suffolk only

Source: Mark Overton, 'Re-establishing the English Agricultural Revolution', *Agricultural History Review*, 44:1 (1996), 6.

c) **Robert Allen: The Leading Neo-Marxist View on agricultural productivity changes**

I) **First, in terms of overall productivity gains, for the period 1700 to 1850:** Robert Allen fully supports the views of Campbell and Overton, in the new 1994 edition of *Economic History of Britain Since 1700*, Vol I: *1700-1860* (Cambridge, 1994).

(1) He suggests a more than threefold growth in output (3.37-fold rise), in total output, which is higher than the overall estimate provided recently by Mark Overton (1996), who suggests a more modest 2.85-fold growth.

(2) Compare these data to estimates of 3.5 fold growth by Deane and Cole, and 3.56 fold rise by Nick Crafts.

(3) Total Factor Productivity (of land, labour, and capital, combined): up to a 2.46 fold growth from 1700 to 1850 (minimum of 2.32 fold growth).

ii) **Factor inputs responsible:**

- land productivity by 37%,
- labour productivity by 16%,
- and capital 93%.

iii) **But he denies that Enclosures played any significant role in land productivity changes,** and only an indirect though significant role in labour productivity changes.

iv) **Allen's Explanations for Productivity Gains Outside Enclosures:** his theory of a two-phase agricultural revolution:

(1) **phase one**: **the Yeomen's Revolution of the 17th century** (chiefly the later 17th century:

- the major aspect of agrarian change was increased land productivity, i.e., crop yields, from adoption of the new husbandry, which he contends was applied equally on enclosed and open field farms, though clearly he favours the Open Fields as the more important.
- That productivity growth peaked at about 20 bu. per acre around ca. 1700 -- supporting older views [Fussell]; and he believes that such outputs, in terms of bushels per acre, did not rise very much in 18th century.[35]

(2) **phase two**: **the landlord's revolution in the early 19th centuries:**

- the major aspect of agrarian change now becomes increased labour productivity,
- primarily as the result of an increase in the average size of farms,
- which, he contends occurred in both enclosed and open-field communities, even though he does apply the term 'landlord revolution' to this period, without ever explicitly endorsing the positive role of enclosures.
- He thus contends that, by the early 18th century, open-field farms were equalling enclosed farms in size, averaging about 150 acres.
- His analyses show that as farm sizes increased the amount of labour employed per acre fell, fewer workers per unit of land -- thus increasing labour productivity: in what he calls a 'widespread shift to capital farms using hired labour' –

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[35] As noted, Allen implicitly supports Jackson in his earlier papers, and more explicitly in his 1999 article (n. 5); but his evidence is based upon a mathematical manipulation of just a few probate records for Oxfordshire, ending in 1727: too slim a base to be convincing, at least to me. See also Overton's criticisms of Allen's data and his methods, and Allen's reply to Overton (1999).

- but clearly using much less labour per acre than did the typical small family farms, whose number was diminishing.

v) **My problems with Allen's two-phase revolution:** specifically the 'Yeomen's Revolution':

(1) that Allen ignores the evidence on the shrinkage of the yeomanry's share of land-holdings in the latter part of this era: from 27% in 1690 to 15% in 1690 (see Table 7, in the Appendix)

(2) that (but according to my arguments, advanced earlier) full-fledged Convertible Husbandry was virtually impossible to achieve with Open Field communal husbandry – i.e., with a permanent division and separation between the arable fields and pasture lands

(3) that the New Husbandry required large amounts of capital investments largely unavailable to yeomen farmers, above to all Open Field farmers: note my previous arguments about the necessity for enclosures to obtain mortgage loans.

(4) He ignores his own evidence indicating that of the three factors of production, capital played by far the greatest role in productivity changes

d) **The Debate About the Role of Enclosures in Rising Agricultural Productivity:**

I) **The Clash between neo-Marxists and Conservatives on Enclosures**

(1) **The modern neo-Marxist Views:**

- the new neo-Marxists deny that enclosure provided improved land management or superior farming techniques;
- and they also deny that any substantial gains were achieved in crop yields per acre.
- They argue that the chief impact of enclosure on productivity was through displacing labour: i.e., from mass evictions of the peasantry: and those who remained were more productive;
- and thus that the real object of enclosing landlords was greed: to capture as much of the rising economic rent as possible.

(2) **The Conservatives**: on the contrary argue that Enclosure:

- did generally produce improved land management and
- both permitted and promoted the application of superior farming techniques,
- such as convertible husbandry, Norfolk rotations, or other multiple crop rotations, etc., to eliminate the fallow.

ii) **The neo-Conservative View of Enclosures**: by Michael Turner (and Overton).

(1) We have already seen their views on English productivity gains, which coincide with the last major phase of Enclosures, during the Industrial Revolution era itself.

(2) As shown in the two sets of figures on the screen, Turner analysed land-surveys of both open fields and

neighbouring enclosed farms in 116 English districts over 24 countries for year 1801.

(3) His results indicate that output per acre was overall about 25% greater on the enclosed farms than in open-field villages;

(4) and his statistics, furthermore, also show the extent of regional variations, as well as variations by crops.

(5) But no matter what the crops and the districts, enclosed farms win out every time, in his statistical survey.

(6) To explain how enclosure could produce such dramatic increases, Turner contends that in most cases it simply involved a combination of:

- changing the crops being planted -- by putting specific lands to better use; and
- superior land management: 'total product was improved through best practice methods.'

ENGLISH AGRICULTURE IN 1801: Crop Yields in 116 Open-Field and Enclosed- Field Parishes:

Mean Yields in Bushels per Acre Over 116 English Parishes

CROP	OPEN FIELD YIELD in bushels	ENCLOSED FIELD YIELD in bushels	PERCENTAGE DIFFERENCE
WHEAT	18.2	23.0	**+26.4%**
BARLEY	25.2	30.6	**+21.4%**
OATS	27.8	34.9	**+25.5%**

REGIONAL DIFFERENCES IN ENGLISH AGRICULTURAL PRODUCTIVITY: Percentage Advantage in Productivity for Selected Crops of Enclosed Fields Over Open Fields, in 1801

CROP	SOUTH	EAST	NORTH	WEST
WHEAT	45%	30%	21%	24%

CROP	SOUTH	EAST	NORTH	WEST
BARLEY	1%	40%	16%	21%
OATS	8%	65%	2%	37%

Sources: Michael Turner, 'Agricultural Productivity in England in the Eighteenth Century: Evidence from Crop Yields', *Economic History Review*, 2nd ser. 35 (1982), 389-510; Michael Turner, 'English Open Fields and Enclosures: Retardation or Productivity Improvements?' *Journal of Economic History*, 46 (Sept. 1986), 669 - 92.

v) **Allen's Objections to Turner's evidence on enclosures**:

(1) as already noted, Allen denies (explicitly or implicitly) that enclosures themselves played any major role in productivity changes (other than in terms of scale)

(2) He argues, contra Turner, that the best lands had already been enclosed by 1800.

- But there is certainly no proof of that;
- and conversely one can argue that the best arable lands, especially in the Midlands, were the most difficult to enclose because of strong resistance from the community of open-field farmers (who were no longer peasants).

(3) He also argues that enclosers converted the poorer arable lands into pasture, thus raising the average yields on the better lands left in arable.

- If they did so, that would presumably have meant, even so, a more rational use of the land;
- but in any event that would not have meant any permanent conversion to pasture, if the enclosers engaged in convertible husbandry (alternating land between arable and pasture), as many evidently did.

(4) but statistical tables presented in Allen's more recent publications seem to me to support Turner's views more than his own[36] [or is that perception also ideological?]

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[36] Robert C. Allen, 'The Growth of Labor Productivity in Early Modern English Agriculture', *Explorations in Economic History*, 25 (April 1988), 117-46; Robert C. Allen and Cormac O Grada, 'On the Road Again with Arthur Young: English, Irish, and French Agriculture during the Industrial Revolution', *Journal of Economic History*, 48 (March 1988), 93 - 116; Robert Allen, 'Agriculture During the Industrial Revolution', in Roderick Floud and Donald McCloskey, eds., *Economic History of Britain Since 1700*, Vol. I: *1700 - 1860*, 2nd edition (Cambridge, 1994), pp. 96-116; Robert Allen, 'Agriculture During the Industrial

- On the screen are data from his tables on grain and pulse yields for open and enclosed fields in 1800;
- and these data indicate that enclosed fields did indeed have the higher yields: 28% advantage for oats, 22% for barley, 19% for wheat, 12% for wheat.[37]

Grain and pulse* yields per acre in England, ca 1450 to ca. 1800: in bushels

* pulses are peas, beans, vetches, and similar legumes.

CROPS	OPEN ca. 1450	OPEN ca. 1800	ENCLOSED ca. 1800	Per cent Gain by Enclosure
WHEAT	10.7	18.6	22.1	18.8%
BARLEY	16.8	26.3	32.1	22.1%
OATS	11.7	30	38.5	28.3%
BEANS/PEAS	10	20.4	22.9	12.3%

Source: Robert C. Allen, 'The Growth of Labor Productivity in Early Modern English Agriculture', *Explorations in Economic History*, 25 (April 1988), 117-46.

Outputs of principal agricultural commodities, 1700 - 1850
in Millions of Units (Bushels and Pounds)

COMMODITIES	Units	1700	1750	1800	1850	% Rise
Grains and pulses	bushel	65	88	131	181	178.46

Revolution, 1700 - 1850', in Roderick Floud and Paul Johnson, eds., *Cambridge Economic History of Modern Britain*, 3rd edn., 3 vols. (Cambridge and New York: Cambridge University Press, 2004): Vol I: *Industrialization, 1700 - 1860*, pp. 96-116; Robert Allen, 'Tracking the Agricultural Revolution in England', *The Economic History Review*, 2nd ser., 52:2 (May 1999): 209-35.

[37] Allen says that this is an unusual year; and that for reasons given in an unpublished paper, these results exaggerate the differences. But his reasons are not clear to me.

COMMODITIES	Units	1700	1750	1800	1850	% Rise
Meat	lb.	370	665	888	1356	266.48
Wool	lb.	40	60	90	120	200.00
Cheese	lb.	61	84	1122	157	157.38
Volume in 1815 Prices (£ million)						
Grains/potatoes	£mill	19	25	37	56	194.74
Livestock products	£mill	21	34	512	79	276.19
TOTAL	**£mill**	**40**	**59**	**88**	**135**	**237.50**

Source: Robert Allen, 'Agriculture During the Industrial Revolution', in Roderick Floud and Donald McCloskey, eds., *Economic History of Britain Since 1700*, Vol. I: *1700 - 1860*, 2nd edition (Cambridge, 1994), Table 5.1, p. 102.

Crop yields in bushels per acre, 1700 to 1850

CROPS	1700	1750	1800	1850	% Change
Wheat	16.0	18.0	21.5	28.0	78.1
Rye	17.0	18.0	26.0	28.0	64.7
Barley	23.0	25.0	30.0	36.5	58.9
Oats	24.0	28.0	35.0	40.0	66.7
Beans/Peas	20.0	28.0	28.0	30.0	50.0

Source: Robert Allen, 'Agriculture During the Industrial Revolution', in Roderick Floud and Donald McCloskey, eds., *Economic History of Britain Since 1700*, Vol. I: *1700 - 1860*, 2nd edition (Cambridge, 1994), Table 5.7, p. 112.

v) **Allen on Labour Productivity and Enclosures**:

(1) As a neo-Marxist (as opposed to an orthodox Marxist), Allen believes that large-farms, many or most of them enclosed by 1800, ultimately did result, if only indirectly, in significant labour displacement to permit such labour to be employed elsewhere.

(2) But to be fair and just to Allen, he makes crystal clear his complete rejection of the more traditional Marxist view that enclosures directly produced mass evictions of the peasantry, in his recent (1994) survey of agrarian change

(3) **Allen's Table on labour productivity**: I find very important.

- It shows a significant growth in labour productivity from the 16th to early 19th century, rising about 110%;
- and, furthermore, for 1800, his table does suggests a 12% advantage for enclosed fields in labour productivity.

English labour productivity in grain farming, 1600 - 1800

Category of Productivity	**1600 Open**	**1700 Open**	**1800 Open**	**1800 Enclosed**
Output per Acre in lb.	2.55	3.49	3.49	3.92
Number of Workers per Acre	1.24	1.17	0.91	0.91
Output per Worker in lb.	2.05	2.97	3.83	4.30
Index of Labour Productivity 1600 = 1.00	1.00	1.45	1.87	2.10

Source: Robert C. Allen, 'The Growth of Labor Productivity in Early Modern English Agriculture', *Explorations in Economic History*, 25 (April 1988), 117-46.

(2) **Table on Revenues and Costs in Arable Farms by farm size, for the later 18th century (ca. 1770)**:

with total costs and labour costs per acre, and the resulting 'Ricardian Surplus:'

Revenues, costs, and 'Ricardian Surplus' (economic rent) of English farms: per acre, and by farm size

Farm Size in Acres (50 a. increments)	Total Revenue per Acre	Total Costs per Acre	Labour Costs per Acre	Ricardian Surplus per Acre	Number of Farms in Sample
0-50	4.0399	3.0615	1.5016	0.9783	8
50-100	4.3094	3.1146	1.3023	1.1948	45
100-150	3.7694	2.4290	1.0215	1.3404	16
150-200	4.4774	2.3931	0.9598	2.0842	22
200-250	4.0605	2.5283	0.6228	1.5322	4
250-300	3.5078	2.0145	0.7641	1.4934	12
300-350	5.0522	2.7088	0.9025	2.3434	4
350-400	3.2252	1.8165	0.6191	1.4087	2
400-450	4.9065	2.4322	0.6422	2.4743	2
450-500	**5.3128**	**2.3392**	**0.6781**	**2.9736**	3
500-550	-	-	-	-	0
550-600	4.8578	2.2600	0.6199	2.5478	6
600-650	3.3538	2.0028	0.4878	1.3510	1
650-700	4.0183	2.1921	0.5910	1.9162	3

Source: Robert C. Allen, 'The Growth of Labor Productivity in Early Modern English Agriculture', *Explorations in Economic History*, 25 (April 1988), 117-46 (Table 8, p. 128).

His table demonstrates that as farm size increased, their labour costs fell per acre. They fall consistently until the size of 200-250 acres, then rise, then generally fall after 350 acres, with lowest cost per acre in 600-650 acre size.

(3) **Larger-scale farms**: could employ a better, more productive division of labour -- i.e., work crews with specialized labour; thus requiring less labour per acre.

(4) Allen, however, again does not believe that Enclosure itself made any real difference (does not seem to believe his own figures):

- i.e., that open-field farmers also economized on labour with larger holdings.
- While admitting that average size of enclosed farm holdings was much larger than open-field holdings up to 1700, he argues that during the 18th century, the two groups became roughly

comparable in size

- but, without explaining what he means by open-field holdings: scattered strips; or consolidated, engrossed, but still open holdings?

(5) **Farm size and crop yields**: note that both Robert Allen and Mark Overton agree that, statistically speaking, farm size has no apparent relationship with crop yields (only with labour productivity).

(6) **Growth of labour productivity**: his research finds full support from the findings of Tony Wrigley (doubling in productivity from 17th to early 19th century) and Gregory Clark (fourfold increase, from ca. 1300 to ca. 1850).

(7) **To summarize Allen's view for the longer run:**

- he argues that labour productivity in agriculture had tripled between 1700 and 1850;
- and that English labour productivity was at least one-third greater than that of French farmers (which obviously must also have risen over this period) and was twice as high as that of Russian peasant farmers.

vi) **Robert Allen, in 'Tracking the Agricultural Revolution in England':** in a more recent article, of May 1999 in *The Economic History Review*, does not really say that much that is now, since his objectives are twofold:[38]

(1) to re-establish his claim that there were two agricultural revolutions:

- the yeomen's revolution of the 17th century, in terms of land productivity
- the landlord's revolution (though now downplaying their role) in both labour and land productivity in the first half of the 19th century

(2) thus the other objective is to refute Overton's claim in re-asserting the traditional view that the real Agricultural Revolution accompanied the Industrial Revolution from the 1760s.

(3) But both of these historians in fact seem to agree, and agree also with Holderness, that the really impressive growth occurred after 1800, and presumably after 1815, when the end of the Napoleonic Wars led to a fall in prices and the abandonment of much high cost marginal land.

(4) If a picture is worth a thousand words, as it most certainly is here, I show you Allen's latest compilation and manipulation of the statistical evidence to produce the following six graphs [which are posted online separately, from the lecture itself, within a Word document.]

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[38] These views are summarized in his chapter: Robert Allen, 'Agriculture during the Industrial Revolution, 1700 - 1850', in Roderick Floud and Paul Johnson, eds., *The Cambridge Economic History of Modern Britain*, Vol. I: *Industrialisation, 1700 -1860* (Cambridge and New York: Cambridge University Press, 2004), pp. 96-116.

7. **Contributions of the Agricultural Revolution and Enclosures to Economic Growth:**

a) **increases in total agricultural output from net additions of land:**

I) **In particular those that resulted from bringing new lands,** waste lands, under the plough, especially during the wartime years of very high grain prices (1795-1812);

ii) **and all (or most) of these new lands added to the agricultural stock:** were evidently the result of enclosures -- enclosures of the open wastes.

iii) **But, as just suggested, some new lands were unwisely brought under the plough:**

(1) they were too infertile, too costly to work.

(2) As just noted, when prices necessarily collapsed after the Napoleonic Wars, and the end of the blockades that had impeded grain imports, such marginal lands were forced out of production (and were not even restored to cultivation during dark days of WW II).

(3) See the graph: on the sharp fall in grain prices after 1815

iv) **Growth in Livestock Production**:

(1) See the previous table by Allen (1994) on the growth of agricultural production, which includes animal products.

(2) Older figures had indicated an overall growth in the sheep population from about 11 to 26 million (which seems exaggerated).

b) **Supply of Industrial Raw Materials**: also greatly increased.

I) **Above, wool for the woollen and worsted textile industries:** more than a doubling of the sheep population, as noted before: supposedly 11 to 26 million.

ii) **Flax for the linen industries:** out of which grew the so-called cotton industry, really a fustian industry, of the Industrial Revolution era.

iii) **hides for leather-making:** and also fats for soap and candle making, of bone for manufactures, from the growth of livestock herds.

iv) **grains for brewing and distilling industries.**

c) **Population and the Food Supply**: **Did Agricultural Growth succeed in feeding all of England's expanding population?**

I) **In absolute terms, undoubtedly agricultural production expanded considerably:**

(1) but by how much is a matter of considerable debate again between optimists and pessimists.

(2) Since the population of England & Wales almost doubled from 6.3 million in 1751 to 12.3 million in 1821, we must ask whether grain production also doubled?

(3) Though we regrettably lack adequate data on English grain production in this era, we can still answer this

question. [See again Allen's figures]

ii) **The blunt answer is, to repeat my earlier comments, NO**: England did not succeed in feeding all of its growing population; and from the 1770s, as previously stressed, England became a net importer of grain and foodstuffs.

iii) **Nevertheless, those imports still represented only 5% - 10% of total consumption**: and that put England at a considerable advantage over the Dutch, who, in this period of steeply rising grain prices, had to import well over half of their grain supplies.

iv) **Did the combination of domestic food production and grain imports succeed in maintaining per capita food consumption and living standards?**

(1) The optimists, led by E.L. Jones, Turner, Deane & Cole, argue that they did.

(2) But here, I am inclined again to support the pessimists on this issue, up to ca. 1820.

(3) During the initial phase of the Industrial Revolution, 1780-1815, there is no doubt that

- the British had to pay substantially more for their food;
- and it seems highly probable that per capita food consumption did decline in this period, particularly during the war years from 1792 to 1815.

(3) As noted earlier, certainly that warfare did result in periodic disruptions of much needed grain imports.

(4) And even if per capita food consumption was generally maintained, those high prices must have meant that consumption of other goods declined.

v) **But certainly after 1815, when grain imports were no longer blocked by war,**

(1) grain prices fell sharply, so that food became vastly cheaper and more abundant;

(2) the so-called Agricultural Revolution, or the evolutionary processes of agricultural modernization were then producing clear net gains for the whole population, with rising per capita food consumption.

vi) **Jackson, as just noted, contends that the period 1740 to 1790 was one of slow growth or near stagnation in English agriculture;**

(1) but he does admit that faster growth can be found after 1790, and especially after 1820.

(2) Even Turner argues that agricultural growth was faster after 1800 than before: the most rapid growth occurred in the years 1830-1850, in their views.

vii) **Conclusions on population growth, agriculture, and the food supply**:

(1) That during much of the Industrial Revolution era, but especially after the Napoleonic wars (1815),

- the agricultural sector did succeed in feeding most, if not all, of that rapidly growing population
- and most importantly (along with commercial imports) in feeding the new industrial towns whose populations and labour forces were growing at a disproportionately faster rate.

(2) The fact that Great Britain, as its population rapidly grew, became more and more dependent on food imports does not mean, however, that its agricultural sector was defective;

(3) it means that its commercial sector was also permitting rapid population growth by securing food supplies from abroad.

(4) That is a normal and desirable sign of economic development of an industrializing country.

(5) As will be noted, when we come to British agriculture in the 19th century (January) and Free Trade, from 1846: grain imports markedly increased (especially from the 1870s, with steam shipping) to account for 83% of total British grain consumption by the 1890s

d) **Enclosures and the Labour Supply for Urban Industry**:

I) **This is certainly and obviously one of the most contentious issues in economic history:** an even bigger battleground between Marxists & Conservatives [and the chief issue in the assigned essay topic on 'Enclosures and the Industrial Revolution'].

(1) The Marxists and many Fabian Socialists argue or imply that Enclosures produced the mass evictions of tens of thousands of small farmers and rural poor, driving them into industrial towns in search of work as cheap, exploited labour for the new industries of Industrial Revolution.

(2) But Conservatives on other hand argue that Enclosures did no such thing, and instead actually produced a major increase in agricultural employment.

ii) **Consider these two sets of statistics on agricultural employment**:

(1) **Statistics of Deane and Cole (2nd edn. 1969):** by conservatives

in 1800: 1.7 million employed = 18.7% of 9.1 million

in 1850: 2.1 million employed = 11.7% of 17.9 million.

(2) **Allen's statistics** (1994: in Floud and McCloskey, ed., *Economic History of Britain*): on changing labour employment in agriculture: by a neo-Marxist, which show lower levels of employment by stricter definitions of wage-earners in agriculture than employed by Deane and Cole:

Employment in English/Welsh agriculture, 1700 - 1851, in thousands

Category	**1700**	**1800**	**1851**	**% Change**
Men	595	628	971	63.19

Category	1700	1800	1851	% Change
Women	505	426	409	-19.00
Boys	433	351	144	-66.74
TOTAL	1533	1405	1524	0.59
WEIGHTED INDEX OF LABOUR INPUT	100	95	116	16.00

Source: Robert Allen, 'Agriculture During the Industrial Revolution', in Roderick Floud and Donald McCloskey, eds., *Economic History of Britain Since 1700*, Vol. I: *1700 - 1860*, 2nd edition (Cambridge, 1994), Table 5.3, p. 107.

(3) Note the overall increase in male labour employment,

- somewhat offset by declines in employment of women and children;
- but weighting the components by wages, the total labour input did rise.

iii) **That increased employment can be explained by both**:

(1) the increase in new lands brought under cultivation, perhaps 8% - 12%.

(2) and by the much more intensive farming of traditional lands, with virtual elimination of the fallow: by multiple crop rotations, with or without convertible husbandry (which may have permitted some extensive pastures to become arable).

iv) **Nevertheless also note the indisputable fact that the *proportion* of that growing population engaged in agriculture fell considerably:**

v) **That reflects a much higher productivity per man and per acre, meaning:**

(1) that a much smaller proportion of the population was now required in agriculture,

- liberating manpower and resources for other sectors;
- and that would mean that many younger sons were encouraged to leave family farms before becoming engaged in agriculture (rather than being expelled).

(2) that increased agricultural productivity and food supplies permitted urban areas to grow at disproportionately faster rates, with higher birth rates

(3) Note that in Great Britain and Western Europe generally, death rates generally always exceeded birth rates, reflecting the unhealthy conditions of most towns and cities, and the related problem of contagion in

spreading diseases.

(4) Therefore towns could grow only from and by rural immigration – by attracting people from the surrounding countryside.

(5) Certainly, the industrial towns were now growing faster than most rural areas.

vi) **E.L. Jones has shown (or contended):** that the number of persons fed by one English farmer rose from 1.7 persons in 1700 to 2.5 persons in 1800.

vii) **Consider once more that statistical evidence of Robert Allen on increasing labour productivity in English agriculture.**

(1) Whatever the causes, they prove conclusively that the consequence of these agrarian changes was in having fewer agricultural workers per acre:

(2) i.e., labour displacement as source of rising labour productivity (getting rid of redundant labour, or disguised unemployment).

viii) **Compromise view**:

(1) that Enclosures and agrarian change, along with industrialization, together indirectly expanded the labour force for urban industry over time, without the mass expulsions pictured in old texts (and by Karl Marx himself, in *Das Kapital*).

(2) Yet many conservative historians have been equally at fault in ignoring the extent to which the 18th and 19th-century enclosures did result in evictions and displacements of peasant tenants

(3) I stress once more the obvious fact that in the 19th century industrial towns could grow only from rural immigration:

- simply because, to repeat, urban mortality rates always exceeded natural urban birth rates, until late in the 19th century
- That imbalance between urban death and birth rates remained true until the discovery of the bacterial transmissions of diseases by Robert Koch and Louis Pasteur, German and French micro-biologists, respectively, in the late 1870s .[39]
- that discovery in turn, quickly led to the development of urban water-purification and related purification systems: i.e., with the obvious realization that so many bacterial diseases

[39] In 1876, Robert Koch had demonstrated that the bacterium *Bacillus anthracis* causes anthrax, a disease of animals also transmissible to humans. He subsequently discovered the two bacteria that cause tuberculosis and cholera. In 1905, he won the Nobel prize in medicine. Louis Pasteur's 1878 paper on micro-organisms in various beverages led to the 'pasteurization' process of heating milk to kill harmful bacteria in milk. See the website for Louis Pasteur et l'Institut Pasteur: http://www.pasteur.fr/pasteur/histoire/histoireUS/index.html

were water-borne, especially since the disposal of so much raw sewage was thorough rivers and streams (to carry the wastes to the sea).[40]

(4) Prior to those developments, when rural migration was the only possible and positive agency for urban growth, that rural migration to expanding industrial towns (offering higher wages) was obviously related to the socio-economic changes of Enclosures,

(5) That was, of course, necessarily combined with increased agricultural productivity, thereby economizing on rural labour, in order for such labour to be released from the land.

ix) **Thus, it would be foolish to deny the adverse social consequences of Enclosures,** and related economic changes: for, to repeat, they did uproot many people.

(1) Economizing on labour obviously means reducing the quantity of labour per acre.

(2) Together, these economic changes converted a large number of small tenant farmers into a class of full-fledged landless labour -- a rural proletariat.

(3) For decades, many remained rural proletarians, especially when so much industry remained rural.

(4) But more and more their offspring drifted to the towns, as industry became more and more urban over the 19th century.

x) **Who were the chief victims of evictions and displacements during these Enclosures?** Chiefly those of the earlier enclosures:

(1) namely the cottagers (who were also agricultural labourers) and

(2) those customary tenants without guaranteed rights of inheritance:

- customary tenants, or copyholders, for lives
- and copyholders 'at will' (at the will of the landlord).

xi) **Certainly Enclosures and the associated economic changes were vitally important:** in breaking those final, vestigial ties to the soil of the old manorial economy: vitally important in

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[40] See Louis P. Cain and Elcye J. Rotella, 'Epidemics, Demonstration Effects, and Investment in Sanitation Capital by U.S. Cities in the Early Twentieth Century', in Joshua L. Rosenbloom, ed., *Quantitative Economic History: the Good of Counting*, Routledge Explorations in Economic History, vol. 40 (London and New York: Routledge, 2008), pp. 34-53; Louis P. Cain and Elcye J. Rotella, 'Death and Spending: Urban Mortality and Municipal Expenditure on Sanitation', *Annales de démographie historique*, 101:1 (2001), 139-54; Michael Haines, 'The Urban Mortality Transition in the United States, 1800-1940', *Annales de démographie historique*, 101:1 (2001), 33-64; Joseph P. Ferrie and Werner Troesken, 'Water and Chicago's Mortality Transition, 1850 - 1925', *Explorations in Economic History*, 45:1 (January 2008), 1-16.

making labour far more mobile and elastic in supply, necessarily elastic supply for industrialization.

xii) **Note the dramatic change in the statistics on the screen,** on the proportions of the population engaged in agriculture, which also compare the agricultural structures in England and France:

Percentages of Total Populations Engaged in Agriculture England and France, 1500 to 1900		
Year	**England**	**France**
1500	76%	73%
1600	55%	63%
1750	46%	61%
1800	36%	55%
1850	22%	52%
1900	7%	43%

Sources:

E. Anthony Wrigley, 'Urban Growth and Agricultural Change: England and the Continent in the Early Modern Period', *Journal of Interdisciplinary History*, 15 (Spring 1985), 683-728; and E. A. Wrigley, 'Men on the Land and Men in the Countryside: Employment in Agriculture in Early Nineteenth-Century England', in L. Bonfield et al, eds., *The World We Have Gained* (Oxford, 1985); Robert C. Allen, 'The Growth of Labor Productivity in Early Modern English Agriculture', *Explorations in Economic History*, 25 (April 1988), 117-46; Grantham, *Land, Labour, and Productivity* (1991); George Grantham, 'The Growth of Labour Productivity in the Production of Wheat in the *Cinq Grosses Fermes* of France, 1750 - 1929', in Bruce M. S. Campbell and Mark Overton, eds., *Land, Labour and Livestock: Historical Studies in European Agricultural Productivity* (Manchester and New York: Manchester University Press, 1991), pp. 340 - 63.

e) **Agriculture and Capital Investment: from Rents and Profits**

I) **While direct investments into industry from agricultural rents and profits was probably small,** nevertheless agrarian capital was clearly very important in financing much of the necessary infrastructure for modern industrialization: particularly in canals and transports, mining, etc.

ii) **Capital Investment in Agriculture itself:**

(1) was a most important feature of economic change in this era (when one considers the backward and forward linkages and multiplier effects);

(2) Indeed, the input that expanded the most rapidly in agriculture during this period was not land or labour but capital: from 1700 to 1850, according to Allen, land grew by 37%, labour by 16%, but capital by an astounding 93%.

iii) **Consider his table, on the screen, on capital investments:**

(1) Note that landlords typically supplied capital, i.e., invested in: land acquisitions, land structures (land conversions), farm buildings, fencing, roads, irrigation systems (floating meadows); and of course enclosures themselves.

(2) Tenants normally supplied the capital for, i.e., invested in: farm machinery (ploughs, etc.) and implements, farm-horses, and other livestock.

(3) Though Robert Allen's writings are always concerned with championing the cause of the tenants, especially open-field tenant farmers, these figures again suggest that landlords played the larger role in supplying capital; and furthermore,

(4) the growth in landlord capital investments over the period 1700 - 1850 was appreciably greater than that for their tenants, whose chief investments lay in livestock.

(5) Recall Allen's figures in attributing productivity increases to the three inputs, demonstrating that by far the most important productivity increases came from capital

- land productivity by 37%,
- labour productivity by 16%,
- and capital by 93%.

Capital invested in English/Welsh agriculture

in millions of £ pounds sterling at 1851-60 values

INVESTORS	**1700**	**%**	**1750**	**%**	**1800**	**%**	**1850**	**%**	**% Diff-erence 1850/ 1700**
LANDLORDS Structures Roads, Fences, Enclosures	**112**	61	**114**	58	**143**	59	**232**	66	107%
TENANTS: Implements, Farm Horses, Other Livestock	**71**	39	**81**	42	**99**	41	**121**	34	70%
TOTAL INVESTED	**183**	100	**195**	100	**242**	100	**353**	100	93%

Source: Robert Allen, 'Agriculture During the Industrial Revolution', in Roderick Floud and Donald McCloskey, eds., *Economic History of Britain Since 1700*, Vol. I: *1700 - 1860*, 2nd edition (Cambridge, 1994), Table 5.4, p. 109.

iv) **The agrarian sector was also indirectly important in supplying working capital for industry**: as farmers deposited their savings in local banks who then made loans via the London banks to banks in industrial towns who relent such funds, extended credit to industry.

v) **Many younger sons of wealthy farmers:** themselves went into industry or business with capital resources from their parents.

An Appendix on Labour Productivity

While the evidence seems convincing, at least to me, that labour productivity in agriculture was rising from the later 17th century, if only because of a change in the land:labour ratio, with larger-scale farming, the issue is not quite so clear for the economy as a whole. Consider the recent debate between Jan de Vries and Gregory Clark.

(1) In 1994, in giving his presidential address to the annual meeting of the Economic History Association, Prof. Jan de Vries contended that in the century preceding the Industrial Revolution, or even from the early 17th century, England underwent an 'industrious revolution:' an increase in per capita labour outputs, an increase in labour productivity, as a response to the introduction and more widespread distribution of a very much wider range of consumer products. [See the earlier lectures on international trade, for both the Netherlands and England]. In essence, therefore, the British working classes in particular responded by substituting more of the new consumer goods for leisure, thus requiring them *ipso facto* to work in particular longer hours and more days per year.[41]

(2) Subsequently and much more recently, the German economic historian Hans-Joachim Voth has contended that, if there were such an 'industrious revolution', it came later, 'in late-eighteenth century England, where court records show longer work hours in 1800 than in 1760.'[42]

(3) But even more recently (September 1998), these views have seriously questioned and perhaps refuted in an article by Gregory Clark, 'Work in Progress? The Industrious Revolution', in which he contends that various measures of labour productivity for sawing timber, threshing and

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[41] Jan de Vries, 'The Industrial Revolution and the Industrious Revolution', *Journal of Economic History*, 54:2 (1994): 249-70.

[42] Hans-Joachim Voth, 'Time and Work in Eighteenth-Century London', *Journal of Economic History*, 58:1 (1998): 29-58.

winnowing grain, for which we possess both day-rates and piece-work rates for wages over many centuries, do not show any significant rise in labour productivity from the later Middle Ages to the 18th century. Nor does other evidence indicate that male labourers worked fewer hours per day or fewer days per year in the later-medieval or early modern eras than in the Industrial Revolution era. He concludes by stating that:[43]

> Although the evidence presented above is tentative and to some degrees contradictory, we see that on balance there is little sign of an industrious revolution of any consequence either in the years 1750 to 1800 as favored by Voth nor in the years 1600 to 1750 as favored by de Vries....The existence of a preindustrial industrious revolution thus is a best an open question. Indeed on balance the evidence seems to suggest that even in the Middle Ages labor input per person in England was at high levels. The fabled medieval world of laughter and leisure may turn out to have been instead a more familiar landscape of routine and drudgery.

(4) Several years ago, in an earlier article that Clark does not cite, I came to the same conclusions about hours of work per day and days of work per year, though I did not test for labour productivity per se.[44] Indeed, my studies confirmed the truth of the old saying that: 'A man's work is from sun to sun; a woman's work is never done.' If men worked fewer hours, and fewer hours than women, who had household tasks as well as agrarian and quasi-industrial tasks (e.g. in textiles) to perform, men worked fewer hours chiefly and only in the winter months, when there were fewer hours of sunlight in which to work: eight hours of paid employment per day in the winter vs. twelve hours per day in the summer.

(5) Clark also neglected to consider several very major studies on early-modern labour, and work

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[44] John H. Munro, 'Urban Wage Structures in Late-Medieval England and the Low Countries: Work-Time and Seasonal Wages', in Ian Blanchard, ed., *Labour and Leisure in Historical Perspective, Thirteenth to Twentieth Centuries*, Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte, Beheifte series no. 116 (Stuttgart: Franz Steiner Verlag, 1994), pp. 65-78.

patterns, by the British economic historian Donald Woodward, whose publication details may be found in the footnote below.[45]

[45] Gregory Clark and Ysbrand Van der Werf, 'Work in Progress? The Industrious Revolution', *Journal of Economic History*, 58:3 (September 1998), 830-43. For the most recent study on this issue, see Michael Huberman and Chris Minns, 'The Times They Are Not Changin': Days and Hours of Work in Old and New Worlds, 1870-2000', *Explorations in Economic History*, 44:4 (October 2007), 538-67.

Table 1. **THE EFFECTS OF CHANGING RELATIVE AREAS OF GRASS (LIVESTOCK-PASTURE) AND ARABLE (GRAIN CROPS) ON THE OUTPUT OF A 100-ACRE FARM: IN BUSHELS PER ACRE (WITH LIVESTOCK OUTPUT EQUIVALENTS)**

Assumption: Farm Operating on a Three-Field System with 2/3 in Crops and 1/3 Fallow (Uncultivated, Land at Rest) each Year

Grass Area in Acres	Grain Area in Acres	Fallow Area (at Rest): Acres	Manure Tons per Acre Arable	Grain Yield: Bu. per Acre	Total Grain Output Bu.	Stock Output in Equiv Bu.*	TOTAL OUT-PUT IN BU.
100	0.0	0.0				1,000	1,000
80	13.3	6.7	>10.0	27.5	366	800	1,166
77	**15.3**	**7.7**	**10.0**	**27.5**	**421**	**770**	**1,191**
60	26.7	13.3	4.5	16.5	441	600	1,041
40	40.0	20.0	2.0	11.5	460	400	860
20	53.3	26.7	0.7	8.9	474	200	674
0	66.7	33.3	0.0	7.5	500	0	500

* **Assumption:** That the output of livestock products is equivalent to 10 bushels of grain per acre.

Source: Robert Shiel, 'Improving Soil Fertility in the Pre-Fertiliser Era', in Bruce M. S. Campbell and Mark Overton, eds., *Land, Labour, and Livestock: Historical Studies in European Agricultural Productivity* (Manchester and New York, 1991), p. 71.

Table 2: THE BALTIC AND ENGLISH GRAIN EXPORT TRADES
AVERAGE ANNUAL EXPORTS IN QUARTERS (OF 8 BUSHELS)*

1600-49 TO 1700-49

PERIOD	BALTIC**	ENGLAND	TOTAL
1600-59	719,250	?	?
1650-99	585,900	26,250	612,150
1700-49	325,500	453,600	779,100

* 1 Quarter = 8 bushels = 64 gallons of grain = 480 lb. (1 bu. = 60 lb.; 6 x 80 = 480 lb.)

* about 80% on the seaborne Baltic grain exports, on average, was carried in Dutch ships (a higher proportion in the earlier than in the later periods).

Table 3: AVERAGE ANNUAL ENGLISH GRAIN EXPORTS IN QUARTERS (OF 8 BUSHELS), 1700-09 TO 1760-64

DECADE	GRAIN EXPORTS IN QUARTERS
1700-09	283,000
1710-19	369,000
1720-29	426,000
1730-39	531,000
1740-49	661,000
1750-59	655,000
1760-64	746,000

Table 4. MODEL OF A THREE-COURSE CROP ROTATION SYSTEM: ARABLE LANDS

Year	FIELDS: A	FIELDS: B	FIELDS: C
I	**FALL** (**Winter)** Wheat and/or Rye; and/or Winter Barley ('berecorn')	**SPRING** (**Summer)** Oats, Barley Legumes (Peas and Beans)	**FALLOW** Resting Uncultivated (Double Ploughed) Livestock graze on natural grasses
II	**SPRING**	**FALLOW**	**FALL**
III	**FALLOW**	**FALL**	**SPRING**

(1) **Fall or Winter Fields (Fields A)**:

- consisted of crops that were planted in the Fall, grew in the Spring, and were harvested in mid Summer:
- chiefly grains such as winter wheat and rye (rye being a northern crop in origin); and also winter barley ('berecorn').

(2) **Spring or Summer Fields (Fields B)**:

- fields that were planted with both grain and vegetable crops in the Spring and harvested in the Fall (Autumn):
- barley, oats, legumes (beans, peas)

(3) **Fallow Field (Field C)**:

- these were the fields, about one-third of the village arable, that were left uncultivated for one year, to rest and allow nature to recuperate and restore natural fertility.
- Livestock were allowed to graze on the natural grasses that grew on this field during the fallow year.

Table 5 CONVERTIBLE HUSBANDRY ('UP AND DOWN' FARMING)

SECTION I: PASTURE LANDS FOR GRAZING LIVESTOCK

1) These lands, comprising about half of the farm holdings, are 'laid down to grass' for about five years, for pasturing livestock (sheep and/or cattle), allowing these lands to regain their fertility and store up large stocks of nitrogen. If the livestock are also 'stall-fed' -- i.e., from fodder crops outside the pasture -- their manure will add net amounts of nitrogen compounds to the soil

2) After five or so years, these pasture lands are 'ploughed up for arable', to follow the five-course crop system indicated below for Section II (the other half of the farm holdings). After another five years, these lands, now arable, are again 'laid down to grass' to serve as pasture lands for the following five years.

SECTION II: THE ARABLE FIELDS (with no fallow): comprising the other half.

ARABLE FIELD A:	WINTER GRAINS: Wheat and/or Rye grains
ARABLE FIELD B:	THE NEW LEGUMES: Clover, Alfalfa (Lucerne), and Sainfoin grasses (high nitrogen-fixing properties), as animal fodder crops
ARABLE FIELD C:	PULSES: Beans and Peas (low in nitrogen-fixing properties, for human consumption)
ARABLE FIELD D:	SUMMER GRAINS: Barley (for beer) and Oats (to feed both humans and horses)
ARABLE FIELD E:	OTHER NEW CROPS: Coleseed and Rapeseed (for both industrial oils and animal fodder); or Turnips (chiefly for animal fodder)

'New' Crops Grown Under Multiple Crop Rotations in Convertible Husbandry (or in 'Norfolk Farming'): not new, but much more widely diffused in the 17th & 18th centuries.

Clover, Alfalfa (Lucerne), Sainfoin, Coleseed, Rapeseed, Flax, Buckwheat, Hops, Turnips

Nitrogen Fixing Properties of Various Legumes in kg per hectare (2.47 acres)

Beans and Peas (Pulses)	30 kg per hectare
Clover	100 kg per hectare
Sainfoin	170 kg per hectare
Alfalfa (Lucerne)	225 kg per hectare

TABLE 6

The Physical Impact of Norfolk Rotations

Farm Type	Grain Yields bu/acre	Grain Output in Bushels	Livestock Output (Bushels)	TOTAL OUTPUT IN BUSHELS	Percentage in Grain
A	11.5	460	400	860	53%
B	21.4 (23.9)	642 (717)	950 (950)	1,492 (1,567)	43% 46%
C	16.0 (18.5)	800 (925)	750 (750)	1,550 (1,675)	52% 55%

Farm A: traditional three-course rotation: with fallow, and with a permanent division between arable and pasture lands.

Farm B: partial Norfolk system: displacement of the fallow with field(s) growing turnips, clover, and other legumes: especially lucerne and alfafa/lucerne

Farm C: Ideal Norfolk Four-Course Rotation: eliminating both fallow and permanent pastures, increasing the cultivation of grains, turnips, and legumes

Notes:

(1) Livestock figures are expressed in terms of equivalent outputs measured in terms of bushels of grain, for comparisons.

(2) The figures in parentheses indicate productivity gains from better pest and disease control in adopting the new rotations.

Table 7. **ENGLISH LANDHOLDING IN 1436, 1690**, and 1790

Percentage of Lands Held by English Social Groupings

	1436	**1690**	**1790**
Church and Crown:	35%	10%	10%
Peerage (Aristocracy):	20%	18%	25%
Gentry:	25%	45%	50%
Yeomen Freeholders:	20%	27%	15%

Social Rank and Status in Tudor-Stuart England

THE PEERAGE	**THE GENTRY**
THE HOUSE OF LORDS	**THE HOUSE OF COMMONS**
The Greater Nobility: Lords and Ladies	**The Lesser Nobility: Gentlemen**
1. Duke, Archbishop (Lord)	**6. Baronet (from 1611 only): Sir**
2. Marquess (Marquise) (Lord)	**7. Knight (Sir)**
3. Viscount (Lord)	**8. Esquire (Mr.)**
4. Baron (Lord)	**9. Gentleman (Mr.)**

Sources:

George E. Mingay, *The Gentry: The Rise and Fall of a Ruling Class* (London, 1976), Table 3.1, p. 59, based on J.P. Cooper, 'The Social Distribution of Land and Men in England, 1436 - 1700', *Economic History Review*, 2nd ser., 20:3 (December 1967), 419-40; F.M.L. Thompson, 'The Social Distribution of Landed Property in England Since the Sixteenth Century', *Economic History Review*, 2nd ser., 19:3 (December 1966), 505-17. Table 3.1 (figures adjusted, to add up to 100%).

Table 8: British wheat prices: decennial averages of prices and price-relatives (indices) of wheat at Eton college, in shillings per quarter (8 bushels) from 1600 to 1819

Mean of 1700 - 09 = 100

DECADE	PRICE	INDEX 1700-09 = 100
1600-09	30.80	91.8
1610-19	34.20	101.9
1620-29	35.05	104.5
1630-39	44.74	133.4
1640-49	49.74	147.6
1650-59	40.29	120.1
1660-69	41.19	122.8
1670-79	39.44	117.6
1680-89	31.37	93.5
1690-99	44.92	133.9
1700-09	33.55	100.0
1710-19	37.22	110.9
1720-29	33.92	101.1
1730-39	29.09	86.7
1740-49	28.27	84.3
1750-59	34.39	102.5
1760-69	37.90	113.0
1770-79	44.43	132.4
1780-89	45.97	137.0
1790-99	58.70	175.0
1800-09	80.73	240.6
1810-19	89.03	265.4

* 1 quarter of wheat = 8 bushels = 64 gallons.
20 shillings = one pound sterling; 1 shilling = 12d (pence)

Source: Price data from William Beveridge and published in B. R. Mitchell and Phyllis Deane, eds., *Abstract of British Historical Statistics* (London, 1962), calculated from tables in pp. 48-87.

Table 9: OUTPUTS OF PRINCIPAL AGRICULTURAL COMMODITIES, 1700 - 1850

in Millions of Units (Bushels and Pounds)

COMMODITIES	Units	1700	1750	1800	1850	% Rise
Grains and pulses	bushel	65	88	131	181	178.46
Meat	lb.	370	665	888	1356	266.48
Wool	lb.	40	60	90	120	200.00
Cheese	lb.	61	84	1122	157	157.38
Volume in 1815 Prices (£ million)						
Grains/potatoes	£mill	19	25	37	56	194.74
Livestock products	£mill	21	34	512	79	276.19
TOTAL	**£mill**	**40**	**59**	**88**	**135**	**237.50**

Source: Robert Allen, 'Agriculture During the Industrial Revolution', in Roderick Floud and Donald McCloskey, eds., *Economic History of Britain Since 1700*, Vol. I: *1700 - 1860*, 2nd edition (Cambridge, 1994), Table 5.1, p. 102.

Table 10. UTILIZATION OF ENGLISH and WELSH LANDS, 1700 - 1850

in millions of acres

LAND TYPE	in 1700	in 1800	in 1850	Percentage Change
Arable	11.00	11.60	14.60	32.72
Pasture/Meadow	10.00	17.50	16.00	14.40
Woodlands	3.00	1.60	1.50	-50.00
Wastelands/forests	13.00	6.50	3.00	-76.92
TOTAL	38.00	38.50	37.30	-1.84
TOTAL AGRICULTURAL	34.00	35.60	33.60	-1.18
INDEX OF LAND INPUT	1.00	1.35	1.37	37.00

Source: Robert Allen, 'Agriculture During the Industrial Revolution', in Roderick Floud and Donald McCloskey, eds., *Economic History of Britain Since 1700*, Vol. I: *1700 - 1860*, 2nd edition (Cambridge, 1994), Table 5.2, p. 104.

Table 11 **EMPLOYMENT IN ENGLISH/WELSH AGRICULTURE, 1700 - 1851, in thousands**

Category	**1700**	**% of total**	**1800**	**%**	**1851**	**%**	**% Change**
Men	595	38.8	628	44.7	971	63.7	63.19
Women	505	32.9	426	30.3	409	26.8	-19.00
Boys	433	28.2	351	25.0	144	9.4	-66.74
TOTAL	1533	100.0	1405	100.0	1524	100.0	0.59
WEIGHTED INDEX OF LABOUR INPUT	100		95		116		16.00

Source: Robert Allen, 'Agriculture During the Industrial Revolution', in Roderick Floud and Donald McCloskey, eds., *Economic History of Britain Since 1700*, Vol. I: *1700 - 1860*, 2nd edition (Cambridge, 1994), Table 5.3, P. 107.

Table 12: CAPITAL INVESTED IN ENGLISH & WELSH AGRICULTURE

in millions of pounds sterling of 1851-60 values

INVESTORS	**1700**	**%**	**1750**	**%**	**1800**	**%**	**1850**	**%**	**% Difference 1850/1700**
LANDLORDS Structures Roads, Fences, Enclosures	**112**	61	**114**	58	**143**	59	**232**	66	107%
TENANTS: Implements, Farm Horses, Other Livestock	**71**	39	**81**	42	**99**	41	**121**	34	70%
TOTAL INVESTED	**183**	100	**195**	100	**242**	100	**353**	100	93%

Source: Robert Allen, 'Agriculture During the Industrial Revolution', in Roderick Floud and Donald McCloskey, eds., *Economic History of Britain Since 1700*, Vol. I: *1700 - 1860*, 2nd edition (Cambridge, 1994), Table 5.4, p. 109.

Table 13: **UTILIZATION OF THE ARABLE LANDS: CROPS AND FALLOW, 1700 - 1850**

in millions of acres

Crops	1700	1750	1800	1850	% Change
Wheat	1.4	1.8	2.5	3.6	157.1
Rye	0.9	0.5	0.3	0.1	-88.9
Barley	1.9	1.4	1.3	1.5	-21.1
Oats	1.2	2.0	2.0	2.0	66.7
Beans/Peas	1.3	1.0	1.2	1.0	-23.1
Turnips	0.4	1.0	1.3	2.0	400.0
Potatoes	0.1	0.2	0.3	0.4	300.0
Clover	0.5	1.0	1.2	2.2	340.0
Fallow	3.3	2.5	1.5	1.8	-45.5
TOTAL	11.0	11.4	11.6	14.6	32.7

Source: Robert Allen, 'Agriculture During the Industrial Revolution', in Roderick Floud and Donald McCloskey, eds., *Economic History of Britain Since 1700*, Vol. I: *1700 - 1860*, 2nd edition (Cambridge, 1994), Table 5.6, p. 112.

Table 14: ENGLISH CROP YIELDS IN BUSHELS PER ACRE, 1700 TO 1850

CROPS	1700	1750	1800	1850	% Change
Wheat	16.0	18.0	21.5	28.0	78.1
Rye	17.0	18.0	26.0	28.0	64.7
Barley	23.0	25.0	30.0	36.5	58.9
Oats	24.0	28.0	35.0	40.0	66.7
Beans/Peas	20.0	28.0	28.0	30.0	50.0

Source: Robert Allen, 'Agriculture During the Industrial Revolution', in Roderick Floud and Donald McCloskey, eds., *Economic History of Britain Since 1700*, Vol. I: *1700 - 1860*, 2nd edition (Cambridge, 1994), Table 5.7, p. 112.

Table 15: ENGLISH AGRICULTURAL OUTPUT AND PRODUCTIVITY
1700 = 100

	1300	1600	1700	1750	1800	1850
OUTPUT						
Population Method		80	100	121	159	272
Volume Method			100	127	191	285
Demand Method			100	143	172	244
AREA						
Arable Area			100		128	170
Sown Arable			100		135	199
Meadow and Pasture			100		147	103
Total Area			100		138	132
LAND PRODUCTIVITY						
By population			100		115	207
By Volume			100		138	216
Crop Productivity[a]	3.05					6.73
Livestock Productivity[a]	1.04					6.56
Wheat Yields [b]	79	72	100	123	136	180
Cereal Yields [c]	115	92	100	135	158	250
LABOUR PRODUCTIVITY						
By Population		77	100	126	141	197
By Volume of Output			100	134	170	206

a. Estimates of Gregory Clark (1993) in terms of bushels of wheat.
b. Hampshire, Herefordshire, Lincolnshire, Norfolk, Suffolk; but 1300 for Norfolk, Hampshire only.
c. For Norfolk and Suffolk only

Source: Mark Overton, 'Re-establishing the English Agricultural Revolution', *Agricultural History Review*, 44:1 (1996), 6.

Table 16: GRAIN AND PULSE* YIELDS PER ACRE IN ENGLAND,

c. 1450 TO CA. 1800: IN BUSHELS per ACRE

CROPS	OPEN ca. 1450	OPEN ca. 1800	ENCLOSED ca. 1800	Per cent Gain by Enclosure
WHEAT	10.7	18.6	22.1	18.8%
BARLEY	16.8	26.3	32.1	22.1%
OATS	11.7	30.0	38.5	28.3%
BEANS/PEAS	10.0	20.4	22.9	12.3%

* pulses are peas, beans, vetches, and similar legume.

Source:

Robert C. Allen, 'The Growth of Labor Productivity in Early Modern English Agriculture', *Explorations in Economic History*, 25 (April 1988), 117-46.

Table 17: ENGLISH LABOUR PRODUCTIVITY IN GRAIN FARMING, 1600 - 1800

Category of Productivity	1600 Open	1700 Open	1800 Open	1800 Enclosed
Output per Acre in lb.	2.55	3.49	3.49	3.92
Number of Workers per Acre	1.24	1.17	0.91	0.91
Output per Worker in lb.	2.05	2.97	3.83	4.30
Index of Labour Productivity **1600 = 1.00**	1.00	1.45	1.87	2.10

Source:

Robert C. Allen, 'The Growth of Labor Productivity in Early Modern English Agriculture', *Explorations in Economic History*, 25 (April 1988), 117-46.

Table 18: **Revenues, costs, and 'Ricardian surplus' (economic rent) of English farms: per acre, and by farm size**

Farm Size in Acres (50 ac. increments)	Total Revenue per Acre	Total Costs per Acre	Labour Costs per Acre	Ricardian Surplus per Acre	Number of Farms in Sample
0-50	4.0399	3.0615	1.5016	0.9783	8
50-100	4.3094	3.1146	1.3023	1.1948	45
100-150	3.7694	2.429	1.0215	1.3404	16
150-200	4.4774	2.3931	0.9598	2.0842	22
200-250	4.0605	2.5283	0.6228	1.5322	4
250-300	3.5078	2.0145	0.7641	1.4934	12
300-350	5.0522	2.7088	0.9025	2.3434	4
350-400	3.2252	1.8165	0.6191	1.4087	2
400-450	4.9065	2.4322	0.6422	2.4743	2
450-500	**5.3128**	**2.3392**	**0.6781**	**2.9736**	3
500-550	-	-	-	-	0
550-600	4.8578	2.26	0.6199	2.5478	6
600-650	3.3538	2.0028	0.4878	1.351	1
650-700	4.0183	2.1921	0.591	1.9162	3

Source: Robert C. Allen, 'The Growth of Labor Productivity in Early Modern English Agriculture', *Explorations in Economic History*, 25 (April 1988), 117-46 (Table 8, p. 128).

The maximum 'Ricardian surplus' [economic rent] was obtained on farms ranging in size from 450 to 500 acres; but note that the sample size is only 3, and that there are no farms recorded for the next acre-increment, i.e., farms of 500-550 acres. Allen notes that the table was 'computed from the sample of farms surveyed by Arthur Young ca. 1770 and analysed in 'Robert Allen, 'The Efficiency and Distributional Consequences of Eighteenth Century Enclosures', *The Economic Journal*, 92 (Dec. 1982), 937 - 53. In this table, 'a uniform set of prices is used in the computations and harvest labor is estimated by piece rates. Arable farms are more than 45% arable and pastoral farms are less than 45% arable..... Farms operated by gentlemen are excluded in this and all other calculations, as are farms of more than 700 acres.'

Table 19.

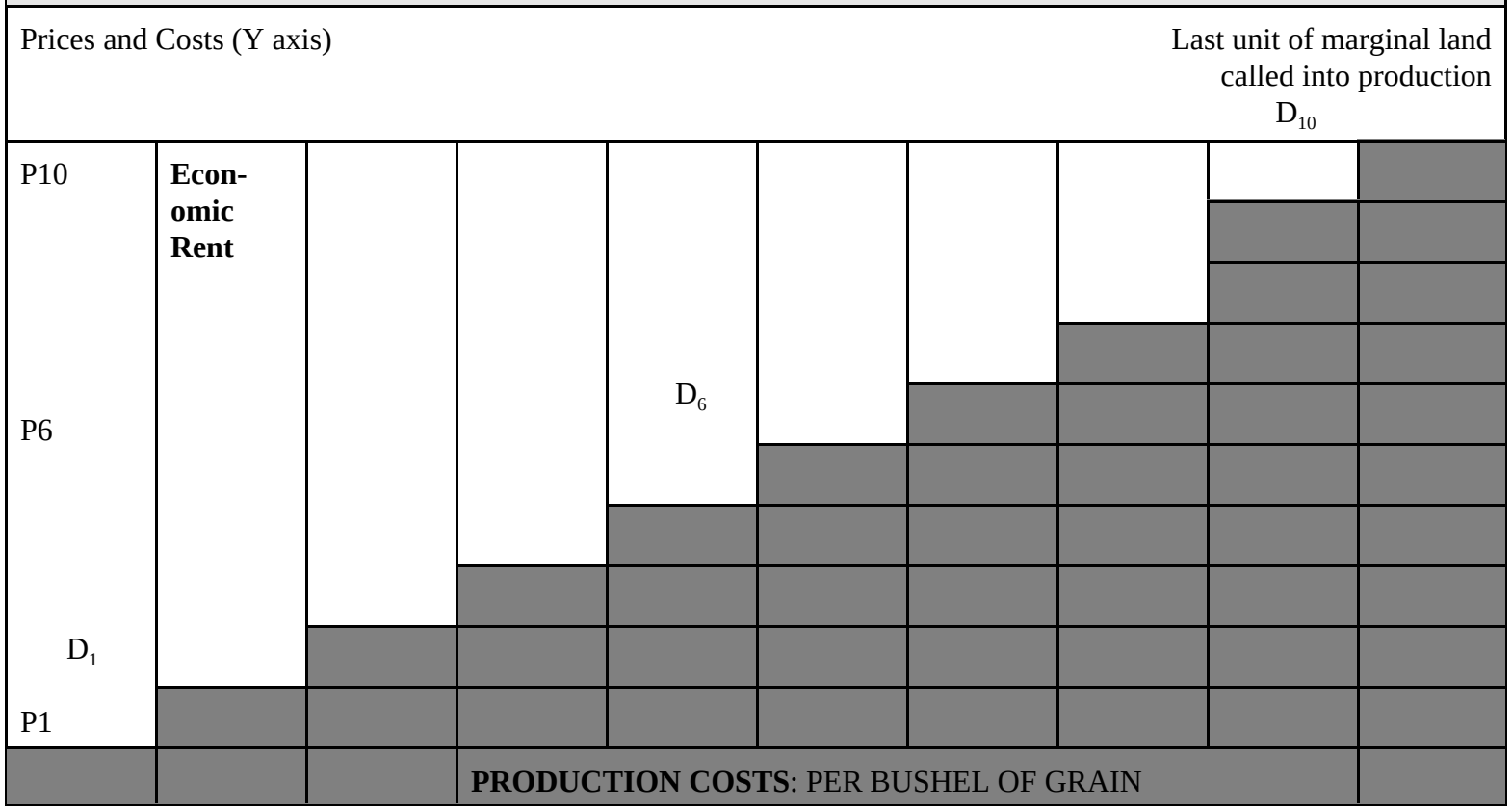
Proportions of the total populations of England and France engaged in agriculture and related occupations 1500 - 1900

Year	England	France
1500	76%	73%
1600	55%	63%
1750	46%	61%
1800	36%	55%
1850	22%	52%
1900	7%	43%

Sources:

E. Anthony Wrigley, 'Urban Growth and Agricultural Change: England and the Continent in the Early Modern Period', *Journal of Interdisciplinary History*, 15 (Spring 1985), 683-728; and E. A. Wrigley, 'Men on the Land and Men in the Countryside: Employment in Agriculture in Early Nineteenth-Century England', in L. Bonfield et al, eds., *The World We Have Gained* (Oxford, 1985); Robert C. Allen, 'The Growth of Labor Productivity in Early Modern English Agriculture', *Explorations in Economic History*, 25 (April 1988), 117-46; Grantham, *Land, Labour, and Productivity* (1991); George Grantham, 'The Growth of Labour Productivity in the Production of Wheat in the *Cinq Grosses Fermes* of France, 1750 - 1929', in Bruce M. S. Campbell and Mark Overton, eds., *Land, Labour and Livestock: Historical Studies in European Agricultural Productivity* (Manchester and New York: Manchester University Press, 1991), pp. 340 - 63.

THE RICARDO MODEL OF ECONOMIC RENT IN GRAIN PRODUCTION



UNITS OF LAND ADDED TO PRODUCTION (X axis)
- production costs per bushel of grain: shaded area
- economic rent per bushel of grain: blank area

P10: the final market price per bushel of grain, determined by the marginal cost of producing the last bushel of grain on the last unit of land called into production, by population growth,

The Era of the 'Industrial' and 'Agricultural' Revolutions:
Interacting Relationships among Population, Growth, Agricultural Changes and Urban Industrialization

Enclosures and Agricultural Improvements

Urbanized market demand for: foodstuffs and raw materials from agriculture

Labour: increased supply of industrial workers

decline of service-in-husbandry and craft-guild apprenticeship

Urban industrialization (the with development of

]

Population Growth

Earlier of age of marriage (females) and higher proportion of women marrying

Higher birth rates and lower death rates

Contributions of agricultural changes to industrialization:

- releasing labour to be employed in industrial towns
- increased foodstuffs to permit growth of industrial towns
- increased supply of industrial raw materials: wool, flax, leather, grains
- increased aggregate demand for industrial goods
- increased capital investments: from rising profits and economic rents

Contributions of Industrialization to Agricultural changes and growth

- growth of urban markets for foodstuffs and raw materials
- increased supply industrial inputs for agriculture (later: machinery)
- improved transportation facilities (canals, better roads) to transport grains, wool, and other products
- growth and diffusion of financial institutions to provide credit and fixed capital for agriculture
- alternative employments for rural populations