Prof. John H. Munro
Department of Economics
University of Toronto

munro5@chass.utoronto.ca
john.munro@utoronto.ca
http://www.economics.utoronto.ca/munro5/

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[five hours of lectures: over three weeks]

PROF. JOHN MUNRO

ECONOMICS 301Y1

The Economic History of Later-Medieval and Early-Modern Europe

LECTURE TOPIC NO. 2:

II. MACRO- AND STRUCTURAL CHANGES IN THE EUROPEAN ECONOMY, 1300 - 1520

A. Population: Demographic Changes Before and After the Black Death, 1290-1520

II. MACRO- AND STRUCTURAL CHANGES IN THE EUROPEAN ECONOMY, 1290 - 1520

Introduction:

(1) **My mentor and Ph.D. supervisor at Yale University, Robert Lopez** (the same scholar quoted earlier, in lecture no. one) would commence his graduate seminar on medieval economic history by stating that:

- 'The twin pillars of economic history are population and prices'
- by prices, he actually meant the combination of money (and other monetary factors) and prices - whose values are always expressed in some form of money (money-of-account: to be explained in a subsequent lecture).
- but we shall also see that demographic changes also had an equally important impact on prices.

(2) **For each semester of this course, we will commence by examining the major macro-economic changes in the European economy:** up to ca. 1500 in the first term, and from ca. 1500, in the second

- for both, we will begin with the demographic changes: involving births, marriages, and death (i.e. factors involved with fertility and mortality – chiefly diseases, such as the Black Death.
- then we will turn to the subject of money and coinage, and more general monetary factors
- then we will try to see how the combination of demographic and monetary factors affected the long term course of prices: in terms of both inflation and deflation
- and in turn, the impact of those long-term price trends of inflation and deflation on economic changes in general.

(3) **After having done that, we will proceed by examining the changes and inter-actions of changes in the four major sectors of the economy:** agriculture, commerce, banking & finance, and industry.

(4) **One major goal is to demonstrate the historical origins of the modern Industrial Revolution,** in Great Britain, which also involved a long term shift in economic power and population from the Mediterranean basin to north-west Europe, and thus especially to Great Britain (i.e., England, Wales, and Scotland).

(5) **You can readily perceive this organization of the course,** and also see the inter-relationships of these changes in the four major sectors (with the macro-economic changes) in the one page Time-chart of European economic history, 1300 - 1750 (as much as I can squeeze onto one page).

- you will find this time-chart useful for the entire course
- you may also bring it with you to the final examination (the only aid allowed).

A. Population: Demographic Changes Before and After the Black Death, 1290-1520

1. What Do We Know about European Population Movements before the 1740s?

a) **The data from the following table, and the accompanying graph:**

i) **Provide some very rough estimates:** about European population movements from the Middle Ages to the onset of the modern Industrial Revolution.

ii) **But the estimates are only very approximate,** and should be taken only as a general guide:

iii) **We begin with what Roberto Lopez called 'the Birth of Europe', in the late 10th century – or let us begin with the opening of the second millennium:**

Year	Population in millions
1000 CE	40
1150	60 - 70
1300	80 - 100
1350	75 - 90
1400	52 - 60
1450	50
1500	61
1550	69
1600	78
1650	74
1700	84
1750	97
1800	122

b) From this general survey that Europe's population, you can see that:

i) **The population had grown very rapidly from around 1000 CE,**[1]

- to reach a peak by about 1300
- or perhaps shortly after, in the early 14th century.

ii) **Subsequently -- though precisely when is uncertain -- Europe's population experienced a catastrophic decline,** perhaps with losses up to 40% or even more.

iii) **For England it may have been even worse:**

(1) for many historians now argue its population had reached about 6 million -- or even more, possibly even 7 million -- in 1300;

(2) and yet in England, during the early 1520s, only 2.25 million can be counted – or estimated, from both military and tax rolls.

(3) However, I must report that recently that some other British historians have used new evidence to contend

[1] Note it is indeed very Eurocentric and culturally incentive to say AD – meaning *Anno Domini* (in the year of our lord, i.e., Jesus Christ) and BC – Before Christ. The now universally accepted designations are instead CE and BCE: meaning the Common Era, and Before the Common Era. Note also, please, that both are counted before and after the year 1 – because there is and was no year zero. When our Western calendar was first devised about the year 525 CE by a Roman monk named Dionysius Exiguus – literally, 'Dennis the Short' – the concept of the zero, which was probably of Hindu origin, had not yet been introduced into the West. It was the Arabs who later, in the Middle Ages, did introduce this vital mathematical variable into Europe. Another footnote, perhaps, on the Lopez thesis.

that England's maximum population, around 1300, was only 4.0 to 4.5 million.[2]

(4) Even that would mean that England lost about half its population in the later Middle Ages.

iii) **In the later 15th or perhaps from the early 16th century,** in some parts of Europe,

(1) population began to recover and then expand, perhaps even more rapidly than before,

(2) to reach a new peak in the late 16th or early 17th century.

iv) **Thereafter, most parts of Europe,** especially in western Europe,

- suffered some often considerable drop in population and
- then demographic stagnation before recovering even more.

(1) Even England and Holland, the two most economically advanced regions of Europe, experienced some drop in population.

(2) Spain and Italy probably each lost about 20%;

(3) while losses in parts of Germany and Central Europe may have been as much as 30% - 35%.

v) **But this early-modern demographic crisis – during the so-called 'General Crisis' of the 17th Century – was certainly not as dramatic or as prolonged as that of the late Middle Ages.[3]**

vi) **and recovery had been achieved in most regions by the mid-18th century**, when a new cycle of rapid and sustained population growth took place,

2. <u>Importance of Demography in European Economic History</u>:

a) **Why does Economic History Depend so much on the Study of Population Changes**?

i) **Why should population changes be so important?** Well, most obviously because population so powerfully affects both the forces of demand and supply in the economy:

ii) **Demand,** to be effective demand, has to be seen in terms of organized markets with mechanisms of exchange, chiefly monetary exchange;

- but just the same: both the size and composition of the market and thus of effective demand will be

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[2] For the most recent views, see Bruce M.S. Campbell, James A. Galloway, Derek Keene, and Margaret Murphy, *A Medieval Capital and Its Grain Supply: Agrarian Production and Distribution in the London Region c. 1300*, Institute of British Geographers, Historical Geography Research Series no. 30 (London, 1993); Pamela Nightingale, 'The Growth of London in the Medieval English Economy', in Richard Britnell and John Hatcher, eds., *Progress and Problems in Medieval England* (Cambridge, 1996), pp. 89-106. For the early 16th century, see Bruce M. S. Campbell, 'The Population of Early Tudor England: A Re-evaluation of the 1522 Muster Returns and the 1524 and 1525 Lay Subsidies', *Journal of Historical Geography*, 7 (1981), 145-54. Even lower estimates of English population up to 1348, can be found in J. C. Russell, 'The Pre-plague Population of England', *Journal of British Studies*, 5:2 (May 1966), 1-21. For much higher estimates of the pre-Plague population see, Michael Postan, *The Medieval Economy and Society: An Economic History of Britain, 1100-1500* (Cambridge, 1972), chapter 3, pp. 27-40; H. E. Hallam, 'Population Movements in England, 1086 - 1350', *Agrarian History of England and Wales*, Vol. II: *1042-1350* (Cambridge, 1988), pp. 508-93; Richard M. Smith , 'Plagues and People: The Long Demographic Cycle, 1250 - 1670', in Paul Slack and R. Ward, eds., *The Peopling of Britain: The Shaping of a Human Landscape* (Oxford: Oxford University Press, 2002).

[3] See this recent journal issue: *The Journal of Interdisciplinary History*, 40:2 (Autumn 2009): special issue: *The Crisis of the Seventeenth Century: Interdisciplinary Perspectives*

powerfully governed by demographic forces,

- and that includes those that govern the age structure of the population
- that in turn means the age-dependency ratio: i.e., the ratio between active productive producers and dependent consumers

iii) **For supply,** obviously the chief and most important inputs in a pre-industrial economy are labour and land;

(1) especially labour, its aggregate supply: since you need labour to make land available for production and to utilize its components.

(2) to be considered in particular: the age composition or structure of the labour force, for the age-dependency ratio, just mentioned.

(3) and finally, as the most important question for economists, the ratio between land and labour will be principally governed by demographic forces.

b) **Some Fundamental Questions About Population Growth:**

i) **What were the causes of population growth?**

(1) Was population growth the consequence of economic growth: to **endogenous factors**? Or:

(2) were there independent biological or social factors that explain population growth: i.e., **exogenous forces**?

ii) **What were the long-term economic consequences of population growth**: positive or negative? (1) Can we postulate instead a positive scenario arguing that economic growth was a possible consequence of population growth?

(2) What are the circumstances that explain when and how population growth promoted economic growth?

(3) and when and how did population growth retard or disrupt economic growth?

(4) Thus, for the negative view, did Europe, despite long phases of economic growth, in fact undergo a series of demographic and economic crises before the Industrial Revolution?

(5) What makes this question so really fascinating is that during the late Middle Ages, after several centuries of continuous population growth and economic expansion, western Europe did indeed suffer, as just noted, a really horrendous demographic crisis, losing perhaps 40% of its population.

iii) **Historians are still divided, very strongly divided, between those who contend that one or the other set of forces were the primary causes of demographic changes:**

(1) **endogenous forces:** thus, many economic historians contend that this demographic crisis was caused or precipitated by internal economic factors in the European economy: in particular, a prior crisis of overpopulation, and

(2) **exogenous forces:** the other camp of historians contend that this crisis was caused by purely accidental factors, outside forces:

- the appearance of bubonic plagues (or supposedly bubonic plague: still a matter of great debate)
- combined with the disastrous effects of continuous warfare (in causing famines and spreading plague).

iv) **Many historians also contend that subsequently, during the later 16th and 17th centuries,** Europe underwent – as suggested earlier – another similar demographic and economic crisis, followed by

depopulation, though on a far smaller scale than in the late Middle Ages.

v) **What therefore was the relationship between population and general economic trends, if those economic trends can be expressed by movements of the price level?**

(1) If we plot on such a graph the general movement of European population, its aggregate size, from about the 12th to the early 19th century, that is until the first phase of the Industrial Revolution,

- we would find this same graph roughly parallels the movement of the price index (i.e., price of a basket of essential goods).
- and it also parallels the general level of economic output in the economy.
- see, for example, the Lindert graph, on the screen, for early-modern England

(2) From that parallel movement, many economic historians have concluded that the essential determinant of price trends were demographic forces: the rise and fall of population.

(3) As I will later try to show, when we examine the economics of money and monetary changes, in late-medieval and early-modern Europe, that view is very simplistic and quite misleading.

iv) **Finally, whether or not population growth was a positive or negative force in European economic development depended upon three conditions pertaining to the particular place and time:** posing those conditions as questions:

(1) When that European region began to experience rapid population growth, was it then underpopulated or overpopulated in relation to its supply of land, natural resource, and capital?

(2) If it was underpopulated, suffering from a scarcity of labour and small markets, then population growth could clearly promise to be a beneficial and not a negative force.

(3) If that European region had already reached its optimum level of population, was its society capable of responding to further population growth by innovations,

- particularly by technological changes to economize on the use of land and natural resources (rather than labour),
- and by investing more capital in those innovations?

v) **If the answer to those questions are negative,** then we do have to consider the economic and social consequences of the famous Law of Diminishing Returns, especially as interpreted by the 19th-century Classical School of Economics, especially by two of its founders: Thomas Malthus and David Ricardo (but not Adam Smith).

3. <u>The Law of Diminishing Returns:</u>

a) **The Land to Labour Ratio: K/L**

i) **Let us begin with the four factors of production,** and the incomes that each factor earns; and their sum constitutes the total incomes earned in society, which you have already learned – I hope – in ECO 100Y and ECO 200Y/204Y/206Y:

LAND	**RENT**
LABOUR	**WAGES**
CAPITAL	**INTEREST**

ENTERPRISE **PROFIT**

ii) **Land and Labour** were certainly the two key factors in the late-medieval and early modern economy, which was fundamentally agrarian.

iii) **Capital**, however, need not and should not be ignored: we can follow many economists in conveniently lumping land and capital together and calling that result 'K', while calling labour 'L'. Hence we are concerned with the ratio between K and L.

b) **Land**: **Labour Ratio and the Laws of Increasing/ Diminishing Returns**:[4]

Refresh your memory from Eco 100Y and ECO 200Y/204Y/206Y, and consider these relationships together on the graph on the screen: by which I hope to show you something that may be new, in the context of Malthusian economics:

(1) **The bottom horizontal line (the X-axis):** indicates the extra units of labour that are added to a fixed stock of land and capital (with constant technology).

(2) **The vertical axis (the Y-axis):** indicates the extra units of output that are produced by adding those extra units of labour to that fixed stock of land and capital.

- Also shown are the total outputs, and
- the average outputs: i.e., the total output divided by number of workers

(3) On the table from which this graph was produced there are columns and rows with numerical data, indicating

- for each amount of labour employed the quantities of total output, average output (total divided by number of workers),
- and marginal output (extra output added by each additional unit of labour).

(4) On the other side, these quantities are plotted on the graph: units of labour plotted by the X-axis, and output for each quantity of labour plotted on the Y axis.

ii) **Increasing Returns**:

(1) We can see first that when land is initially under-utilized, when population is small and sparse, production is inefficient because of inadequate labour to work that land.

(2) With a sparse population, specialization is difficult or impossible; and fixed overheads (including protection costs) have to be divided amongst and borne by few people.

(3) Some forms of physical capital cannot be used effectively until more people are available (both in terms of labour and markets).

(4) Thus efficiency is in fact improved by adding more labour to that land.

(5) As more units of labour are added to that land/capital, the result is not only rising total output, but also rising output per extra unit of labour: that is, the extra or marginal product of labour is rising; the extra output produced by that last unit of labour is greater than that added by his immediate predecessor.

(6) These are, in part, the fruits of labour specialization: i.e., the division of labour by specialized tasks.

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[4] See: http://www.economics.utoronto.ca/munro5/DimReturns.pdf – for the web document version, on my Home Page.

iii) **Finally, after adding more and more labour to that land we reach a point of maximum or optimum efficiency;**

iv) **if, after this point of optimum efficiency,** we add more labour to a fixed stock of land and capital (K), we encounter one of the most famous and important of all economic laws:

v) **The Law of Diminishing Returns, which should really be called the Law of Eventually Diminishing Marginal Returns:**

(1) Thus, after that point of maximum efficiency, each additional or marginal unit of labour added to that fixed stock of land and capital (technology still constant)

- will produce smaller and smaller additional, or extra, or marginal units of output
- i.e., smaller than that produced by the unit of labour previously added.

(2) Note that we are talking about changes in that extra or MARGINAL PRODUCT, and not changes in TOTAL OUTPUT or TOTAL PRODUCT, or even AVERAGE PRODUCT, which will continue to rise for some time after MARGINAL PRODUCT begins to fall.

(3) Note from the graph that the descending Marginal Product curve will intersect the Average Product curve at its maximum or peak (which is also the point where Marginal Cost intersects Average Cost curve; and the optimum production would be at the point that MC = MR).

vi) **Overpopulation, however, begins only after AVERAGE PRODUCT begins to decline:**

(1) But not until AVERAGE PRODUCT has crossed the **SUBSISTENCE LEVEL** line do we have a full-blown demographic crisis: and that line is really determined by qualitative assessments..

(2) It is very important to recognize this point concerning subsistence in any discussion about population and the economy in the pre-industrial era.

c) **Another View of Diminishing Returns in an Agrarian Economy:**

i) **The nature of northern European agriculture:** as we shall see in a later lecture, when we analyse the mechanics of medieval agriculture, northern European agriculture in particular depended upon maintaining a proper balance:

- between grasslands and pastures for livestock and
- arable lands for growing grains and other crops.

ii) **The natural response of the medieval agricultural village economy to population growth:** – with more and larger families -- was to expand the village's arable crop lands at the expense of grass or pasture lands for livestock.

iii) **That soon created a severe problem for livestock husbandry,** because it requires at least twice as much land as does arable farming (grain) to produce the same amount of calories -- sometimes five times as much.

iv) **Consider now the table on the screen:** to show what happens to soil fertility and crop production when arable expands too much at the expense of pasture, reducing the relative supply of manure:

v) **From this table,** you can see that the optimum division (for this particular 100-acre farm) was about three-quarters in pasture and only one-quarter in arable.

- In fact, in settled and developed parts of western Europe, the arable area was normally greater than that for pasture;

- and thus if arable expanded at the expense of pasture, then both marginal and total output fell, because of insufficient manure and over-cropping.

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)

Model: a 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.

d) **Subsistence Crises and Economic Historians**:

i) **Like present-day development economists,** economic historians have been concerned about how full-blown subsistence crises might arise from over-population, i.e.,

(1) from the mechanics of diminishing returns;

(2) but specifically, as just stressed, only when the falling MP curve crosses the subsistence line.

ii) **We can better understand the historical and economic contexts of pre-industrial European subsistence crises through the views of two of the leading 19th-century Classical economists:** Thomas Malthus and David Ricardo.

4. **<u>Population Growth and Economic Pessimism: Malthus and Malthusian Economics</u>**

a) **Thomas Robert Malthus** (1766-1834), a contemporary of Adam Smith, is the most famous proponent of the concept subsistence crises: that population growth inevitably led to subsistence crises, which in turn led to a fall in population to restore equilibrium, again disrupted when population

i) **In his monograph, *An Essay on the Principle of Population*** (1st edn., London, 1798), Malthus contended that:

(1) population would tend to grow geometrically ($1 + x + x^2 + x^3 + x^4 + ...$; i.e., 1, 2, 4, 16, 32, 64 -- always doubling), provided that population growth was **unchecked,**

(2) while the food supply would at best grow only arithmetically (2, 4, 6, 8, 10, 12, etc.), i.e., in incremental additions;

(3) And thus inevitably unchecked population growth would outstrip a country's or region's food supplies, producing impoverishment and malnutrition – if not outright famines – and thus increased mortalities from diseases, etc.,

(4) and those mortality crises would finally check population growth.

ii) **Those pessimistic views have permeated and dominated the study of both economic history and economic development:** so that most such economists view population growth as a negative force – as the greatest enemy of economic progress and economic development.

iii) **Many economic historians thus believe that:**

(1) these vicious cycles and mortality crises based on overpopulation prevailed in all past pre-industrial economies,

(2) and were finally broken only by the modern Industrial Revolution, but then only from the 1820s or 1830s

(3) and hence, for modern development-economists, the Malthusian question or problem is of great importance in understanding the role of modern industrialization, and modern forms of economic growth.

b) **Malthus and Population Growth**: **the Theory of Impoverishment ('Immiserization' or 'Immiseration')**:

i) **Let us repeat the Malthusian proposition:**

(1) that population, **if unchecked,** would tend to grow geometrically, while the food supply would at best grow only arithmetically.

(2) In simple English: the belief that unchecked population growth tends to outstrip the food supply, because of the diminishing returns we have just seen.

ii) **Question**: **why was Marx such a fervent opponent of Malthus?** Or of the crude Malthusian view?

- Because Marx firmly believed that 'feudal and/or capitalist exploitation' and not unchecked population growth was the prime cause of poverty and human misery.
- Hence Malthus' views provided an unpleasant, unwanted challenge to Marx's view

iii) **Although continued and unchecked population growth might produce these catastrophic results,** Malthus himself observed that population did not usually continue to grow geometrically and was usually stabilized below that point of catastrophe -- in what modern demographers call a system of 'homeostatic adjustment'.

c) **Population Checks:** According to Malthus, population growth would usually be brought to a halt by two different sets of checks, though often operating together:

i) **Type I: Providential or Positive Checks**: i.e., the so-called 'Four Horsemen of the Apocalypse': who were (according to most sources) War, Famine, Plague, and Death

- In this respect, we might see famines, malnutrition, and disease as consequences of severe diminishing returns;
- If warfare was not so obvious a consequence, nevertheless widespread warfare could and did spread disease, while disrupting food supplies, bring about famines or malnutrition, further lowering resistance to disease.
- But for Malthus, these providential or positive checks, these disasters, were not in European society the most common checks to population growth.

ii) **Type II: Prudential or Preventive Checks**: what Malthus called 'moral restraints'.

- i.e., population self-control. Malthus emphasized social control of reproduction, as people deliberately chose to have fewer children per family: by marrying later or not at all, by sexual abstinence.
- We shall see this phenomenon later in the so-called European Marriage Pattern, which was very distinctive to late-medieval, early-modern western Europe, and not found elsewhere (until the late 20th century).

d) **What about artificial birth-control**: i.e., by deliberate contraception, abortion, and infanticide? i) Since Malthus was a clergyman (Protestant) in an age when Protestants as well as Catholics opposed such birth-controls, these were hardly examples of what he and his contemporaries considered to be 'moral restraint.' ii) Whether or not these methods were practised in early-modern Europe I shall discuss later.

e) **All of these fertility-control measures may also be seen as either a result of, or a reaction to, falling real incomes, with diminishing returns**:

i) Malthus himself argued that unchecked population growth and a consequent fall in real incomes would lead to a rise in death rates and a fall in birth rates (again by 'moral restraints') to re-establish a demographic equilibrium.

ii) As will be stressed later, Malthus in effect argued that a new and higher-level demographic equilibrium, or self sustained population growth, could be obtained only by a rise in real wages,

- i.e., as a consequence of autonomous economic growth.
- that proposition again indicates that Malthus did not believe in continuous and unchecked population growth.

iii) **Currently, as I noted earlier, many economic historians consider themselves to be 'Malthusian'** in contending that, until the modern Industrial Revolution, the essential determinant of real incomes and of the standard of living was the size and rate of population growth.[5]

iv) **In overly simplistic terms (with which I disagree):**

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[5] For such a division of opinion, consider these three quotations:

a) 'Early modern historians are divided between those who equate growing population with prosperity and those who take the contrary view.' (David M. Palliser)

b) 'The key to Malthusian faith continues to be the belief that population growth lowers living standards.' (Peter Lindert)

c) 'Before 1800 matters fell out much as Malthus had insisted they must. [But after 1800] an increase in poverty was no longer the price of an increase in numbers.' (Anthony Wrigley and Roger Schofield)

- that rising populations led to falling living standards; and
- that falling populations led to rising living standards.

v) But as Ralph Davis has rightly remarked (*Rise of the Atlantic Economies*, p. 16), that if:

> the most powerful upward regulator of income per head was a calamitous drop in population', as has been argued for the 14th and 15th centuries, nevertheless 'the economy of modern Europe would never have come into existence on the basis of population decline.

4. **David Ricardo and the Theory of Economic Rent**: [6]

a) **David Ricardo (1772 - 1823)**: a near contemporary of Malthus, provides a complementary perspective on the negative role of population growth (and thus on the supposedly positive role of population decline, at least for living standards).

b) **His theory of economic rent provides that complementary perspective**

i) it constitutes one of the very most important theorems in both economics and especially economic history; and is thus vital for this entire course (and also for my companion course, ECO 303Y)

ii) it is related to the equally important economic concept of 'opportunity cost'

iii) **The theorem presented here, however, is a combination of the following:**

- Ricardo's own basic theories on land and rent
- the later contributions of the German economist, Johann Heinrich von Thünen (1783-1850).[7]
- later 19th century economists, known as the 'Marginalists': the concept of the margin, as in marginal product, marginal cost, marginal revenue, marginal efficiency of capital, etc.
- whose views were incorporated into Classical Economics: in Alfred Marshall (1842-1924), *Principles of Economics* (1890)
- The Law of Diminishing Returns: discussed earlier, was the result of this form of marginal analysis: marginal product and marginal costs

c) **Ricardo's Definition of Economic Rent:** as used by and attributed to Ricardo, though modified by others.

i) I quote the following definition, which is given in the handout:

> **'Economic rent on land is the value of the difference in productivity between a given piece of land and the poorest [and/or most distant] piece of land producing the same goods (bushels of wheat) under the same conditions (labour, capital, technology, climate).'**

ii) **Productivity** is defined here in terms of both:

- the natural fertility of the soil: including the productivity of the existing technology in utilizing currently available labour and capital;
- and also the relative distance from the same market
  - we are discussing this in terms of regional economics with one market.

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[6] David Ricardo, *Principles of Political Economy and Taxation* (London: 1817; 3rd edn. 1821).

[7] See n. 8, below.

- This part of theorem, on the 'distance from the market', did not originate with Ricardo, but rather with a contemporary German economist:
- Johann Heinrich von Thünen (1783-1850), who noted, some years after the publication of Ricardo's *Principles*, that the closer a piece of land was to the urban core the higher was its market rent (reflecting economic rent).[8]
- You can readily appreciate the significance of this by noting that Toronto rents in the heart of the financial district on Bay or University are higher than those in, say, Rexdale or Jamestown; or, to the north of Toronto: Orangeville or Bolton.

iii) **Thus productivity differences reflect the cost differences in supplying grain** to that one market from that piece of land.

d) **Ricardo argued that population growth will force into production inferior, higher cost agricultural lands:** also known as marginal lands

i) **such marginal lands were (in theory) higher cost because they were:** as just defined

- lands with lower fertility and/or
- lands further away from the market: we assume that at the initial state of settlement, with markets, only the best lands, and those closest to the markets are first utilized

ii) **Population Growth, in that respect**,

(1) inevitably raises the costs and thus the price of grain sold on that market

(2) and, by increasing grain prices, it creates *economic rent* on the better, lower costs agricultural land

(3) Note the basic Ricardian principle: high prices create high rents, and not the other way around (i.e., high rents DO NOT explain high prices)

e) **This concept of economic rent involves these following six suppositions, as given in my online web document on Economic Rent:**[9]

i) first, in the initial stage or starting point, with stable population, only the very best lands are under cultivation: lands that are the most fertile, the most easily worked, and lands that are closest to the market (i.e., lands in and near the town).

ii) second, with population growth, diminishing returns on existing lands force into cultivation new, but inferior lands, here called 'marginal lands':

(1) lands that are less fertile, more difficult to work,

(2) and/or further away from the market: i.e., requiring higher transportation costs.

(3) So: even if they are not necessarily less fertile, higher transportation costs will raise total costs.

iii) **Third, therefore, the necessary consequence of adding on more and more inferior or marginal land**

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[8] Johann H. von Thünen, *Der isolierte Staat in Beziehung auf Landwirthschaft und Nationalökonomie*, vol. I (1826); vol. II.i (1850), Vol. II.ii and Vol. III (1863); in English translation as *The Isolated State*, ed. P. Hall (Oxford, 1966). Most of the rent theory is in the posthumously published Vol. III. See the Appendix on his economic theories.

[9] for the web document version on my Home Page.
See http://www.economics.munro5/ECONRENT.pdf

is the rising cost of producing those extra bushels of grain to feed that growing population.

(1) Note here a very important point for the whole course, on European economic history:

- that agriculture production was typified by long-run inelasticities of supply, with a very wide range between low and high cost units of production
- a far wider range than ever found in most manufacturing industries, especially labour-intensive industries (whose supply curves, therefore, were generally far more elastic).

(2) We must also assume that for any given region, for any one given market zone, there is only one price: the prevailing price that clears the market, satisfying both producers and consumers.

iv) **Fourth: The market price for grain will thus equal the cost of producing that last bushel of grain (under diminishing returns) on that last unit of land forced into production** to feed that larger population;

(1) For nobody is going to produce grain (for long) at a cost higher than the market price.

(2) Actually, as you can now deduce, the level of population and of demand really has determined the price of grain;

(3) for, without that increased demand, that land would not be under cultivation.

v) **Fifth, on that last piece of 'marginal' land, total sales revenue equals total costs, with no surplus**.

(1) The farmer earns just enough to keep him in production:

(2) Those earnings meet what is called his 'transfer cost': i.e., the payment sufficient to prevent him from transferring to another piece of land or another occupation.

(3) But conversely, on the other lands that were put into production earlier, presumably the more productive lands closer to the market, total sales revenue exceeds total costs, because total costs on those better lands are lower.

vi) **Sixth: That differential produces a surplus called ECONOMIC RENT,** which can be seen on the graph.

f) **You may wish to challenge this concept on several grounds:**

i) **that new lands brought into production may have been more fertile** rather than less fertile

(1) indeed unploughed grasslands would have had proportionately far more nitrogen stored up in them.

(2) that is the chief factor determining soil fertility in pre-modern times.

ii) **that new trade routes or transport changes may have brought into production** some new and fertile lands closer to major markets (closer than some old lands).

iii) **that new lands may have benefitted from technological changes** that, for various reasons, perhaps institutional reasons, could not be applied to older lands.

g) **But let us now just consider the model itself,**

i) **if we assume that in pre-industrial economies technological changes are few** and slow to diffuse,

(1) and that eventually population growth would exhaust the supply of any available good lands,

(2) as well as exhausting the additional fertility (nitrogen) stored in them;

ii) **and that economic rent was eventually produced in the dynamic fashion** suggested by this model.

iii) **Consider also the graph showing the behaviour of grain prices, relative to other prices**, in early-modern England, indicating a long-term inelasticity of the grain supply.

h) **A Related Definition of Economic Rent**:

i) **'the excess or surplus of total payments given to any factor of production (land, labour, capital) over and above its 'transfer earnings'**: that is, over and above what that factor would earn in its next best use:'

ii) This is related to the concept of **OPPORTUNITY COST:**

(1) the cost of doing A is the benefit foregone, or the value not received, by doing B instead.

(2) i.e., in using that factor of production to achieve some **alternative** end or objective.

iii) **In order to secure the use of that factor, you have to pay at least its opportunity cost: its transfer earnings**, the amount necessary to keep that factor (person) in its present employment.

iv) So any payment beyond that opportunity cost or 'transfer earnings' is economic rent.

(i) **Relating the two concepts of economic rent**: Ricardo and his followers, in constructing their economic rent model, assumed the following conditions in the short run:

(1) that the land under consideration had only one use -- growing grain (wheat); and

(2) that, in the short run at least, the land was in fixed supply (perfectly inelastic) and in full use.

(3) Nothing had to be paid, therefore, to prevent this land from being transferred to uses other than grain growing -- no transfer payment was necessary -- because this land had no other effective use.

(4) Therefore, by this model, all of the payment to land, i.e., all the rent, is a surplus over and above what is necessary to keep it in its present use of growing grain.

(5) Finally, given the short-run fixed supply of land, the price of land, or the rent for its use, will depend upon the demand for land, which in turn is a function of the price of grain.

j) **'Rent'**: Thus, because of the Ricardo theorem, the term 'rent' in Classical Economics became the term for the surplus payment to a factor of production over and above what was necessary to maintain in its present use, or form of production.

k) **Subsequent elaborations of the theory of rent**:

i) this term was also applied to other factors of production, especially including various forms of labour.

(1) A movie star, as the most widely cited example, with a talent in very scarce and fixed supply, facing a very high demand, will earn a very large rent over and above his/her 'transfer earning',

(2) i.e., if his/her *opportunity cost* is low, because any available and suitable *alternative* occupation would pay so little.

ii) **For agriculture: most land, however, was seen to have other, alternative uses** (though only in the longer-run, since it does take time to convert land use): i.e., livestock raising, growing other crops, industrial uses (mining, etc.)

iii) **thus, from the point of view of any one use of land,** part of the payment made for the use of land would necessarily be a 'transfer payment' in order to keep it in its present agricultural use.

iv) **Thus all factors of production are really similar:** and payments for most of them usually consist both of a transfer payment and a rent.

l) **The Economic Consequences of Population Changes according to the Economic Rent Model:**

i) **Following Ricardo's logic, population growth had three predictable consequences:**

(1) grain prices will rise;

(2) land rents will also rise; and

(3) real wages will fall.

ii) **Conversely, population decline would produce the contrary effects:**

(1) falling grain prices;

(2) falling land rents;

(3) rising real wages

iii) **The Ricardian predictions of the consequences of population growth, with the model on the screen:** with some non- or post-Ricardian analyses

(1) **Rising grain prices**:

- With increasing demand, and relatively inelastic supply, the price of wheat (or some other grain) will rise, and will finally equal the cost of producing the last unit of grain on that last unit of extra or marginal land called into production and cultivated:
- i.e., the price of grain (under pure competition) will equal the marginal cost of producing it.

(2) **Rising land rents**:

- Land rents will rise along with grain prices.
- Prices determine rents; and not the other way around;
- i.e., the price for using land (rent) is derived from the demand for and price of grain.
- Refer once again to the Ricardo Economic Rent model (reading the web document with care) to understand why rents vary so much between different pieces of land: in terms of productivity differences and different distances from the market..

(3) **Falling real wages**:

- As a result of a more adverse land:labour ratio and of diminishing returns on land, real wages will fall.
- You can consider that there two major components in falling real wages:

  (I) **the land:labour ratio,** so that a relative increase in the supply of labour with the same amount of land will lead to a fall in marginal productivity of labour, which in turn will depress real wages; and

  (II) **diminishing returns,** so that higher food prices, a higher cost of living, will further depress the workers' real wages.

iv) **Conversely, the Ricardian predictions of the economic consequences of population decline:**

(1) **Falling grain prices:**

- which would hurt those landlords operating commercial farms,
- but also hurt those peasants similarly producing grain surpluses for the markets.

(2) **Falling economic rents:**

- which would certainly hurt landlords,
- but also those peasants who had earlier managed to hold or to secure some portion of those economic rents produced by prior population growth [see next sub-topic]

(3) **Rising real wages:** as a result of both:

- much more favourable land:labour ratio that should have increased the marginal productivity of labour (at least in agriculture, if not so obviously in industry)
- falling food prices and land/housing rents: fall in the cost of living

m) **What Happened to the Economic Rents: Who Captured the Rents: Landlords or Tenants?**

i) **Ricardo (and also Marx and his followers)** argued that all of that surplus or economic rent was 'captured' or expropriated by the landlord: simply because that the landlord could evict those that refused to pay and replace tenants with those working marginal lands.

ii) **But in historical reality,** as I will demonstrate later, in the topic on medieval feudalism and manorialism, landlords never were able to exercise such power;

(1) instead that surplus was more usually shared between the peasant tenant and his landlord,

(2) according to the nature of the contact and according to the bargaining power that each could exercise.

(3) as a recent study contends, most medieval English lords were not profit-maximizers and were not really interested in exploiting their tenants in this fashion, i.e., in capturing all the economic rent.[10]

iii) That, by the way, is an essential element in considering the related subject of European serfdom (i.e., related to feudalism and manorialism);

iv) and we shall reconsider this in our subsequent topic on the decline of serfdom in western Europe during the later Middle Ages.

n) **Let us now examine more closely the basic Ricardian and Malthusian propositions population growth and decline, but especially Malthus' proposed providential and prudential checks to population growth,** in terms of both death rates and birth rates -- and the economic, social, cultural, and biological factors influencing death and birth rates.

6. Demographic Determinants: Birth Rates, Death Rates, and Diseases

a) **Population change depends obviously upon some combination of the birth rate, the death rate, and net migration**.

Our focus: is going to be almost entirely on birth and death rates.

ii) **Migration can certainly be ignored,** until we get to the early modern-period, when overseas expansion and colonization did indeed play a role.

(1) Just to anticipate the future:

- by the later 17th century, emigration and overseas colonization did have some considerable impact, especially on English demography,
- as did overseas commerce itself, because so many sailors and colonial administrators --as apart from colonists -- died.

(2) Anthony Wrigley and Roger Schofield argue that such emigration was a major factor in the demographic slump of the 1670s and 1680s;

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[10] Bruce M.S. Campbell, 'The Agrarian Problem in the Early Fourteenth Century', *Past & Present*, no. 188 (August 2005), pp. 3-70.

(3) for Holland, Jan de Vries has argued that of the more than one million Dutchmen who went abroad with the Dutch East India Co during the 17th and 18th centuries, two-thirds died overseas.

b) **Birth and Death rates in medieval European societies: were both very high**:

they both fluctuated within a band of about 25/1000 to 40/1000: the birth rate was normally somewhat higher than the death rate, though not much.

ii) **These rates are about 3 to 4 times higher than those of today:**

(1) For comparisons, note that in Canada today: [11]

- the birth rate today is 11 per 1000
- the death rate is 7/1000: only 6.86/1000 for women and 7.48/1000 for men.
- with a life expectancy of 81 for both sexes together: 79 for men and 83 for women
- and an infant mortality rate of 4.90 per 1000 live births (which, however, is higher than the comparable rates for most West European countries)

(2) For the United Kingdom

- BR - 12/1000;
- DR - 9/1000

(3) For Japan: BR: 8/1000 and DR: 10/1000 (BR has gone down and the DR gone up in past several years)

c) **Changes in birth and death rates: which was the more important factor?**

i) **While the 'normal' death rate in late-medieval and early-modern society was about 25 to 35/1000,** in times of serious epidemics death rates could soar as high as 400/1000 (i.e., 40%).

(1) Since birth rates could vary only within a fairly narrow band, we might therefore conclude that in such pre-industrial societies the death rate exerted the much more powerful influence on demographic change.

(2) My late colleague Karl Helleiner argued in this fashion; and you can read those arguments in the *Cambridge Economic History of Europe*, Vol. IV (1967).[12]

ii) **But more recently two English demographic historians,** E. Anthony Wrigley and Roger Schofield, in *The Population History of England, 1541-1871: A Reconstitution* (Cambridge, 1989), have concluded:

(1) that from at the later 17th century, the birth rate became the more powerful and decisive determinant of population change.

(2) Their statistics, however, do not always bear out their thesis for this period;

(3) and their thesis necessarily assumes that, by that time, the radical fluctuations in the death rate had come to an end: i.e., by the 17th century, which, in my view, is not really so.

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[11] For the demographic data for other countries today (or rather from the 2007 data from the United Nations) see Table 1, in the Appendix: *2007 World Population Data Sheet*.

[12] Karl Helleiner, 'The Population of Europe, from the Black Death to the Eve of the Vital Revolution', in E.E. Rich and Charles Wilson, eds., Cambridge Economic History, Vol. IV: *The Economy of Expanding Europe in the 16th and 17th Centuries* (Cambridge, 1967), pp. 1-95, especially pp. 5-19, 68-95.

(4) Their views have restated, in slightly amended form, in more recent publications: [13]

iii) **So let us begin, necessarily, with the older suppositions that**

(1) the death rate was the more dynamic factor;

(2) and then after that, we will look at the newer views concerning birth rates;

(3) and that subject will lead us to European social patterns concerning marriage.

d) **The Role of Diseases in Death Rates**: diseases were certainly by far the most powerful factor determining death rates, and at the same time they also influenced the birth rate in several ways:

i) **For medieval Europe**: the chief diseases were plague, pneumonia, dysentery, typhus, leprosy, and tuberculosis.

ii) **For early-modern Europe**:

(1) we can add to these syphilis: a much more virulent disease than today -- probably a mutation of the endemic African disease known as yaws, imported by the Portuguese

(2) and also: small pox, and then cholera (a major killer in 18th and 19th centuries).

iii) **Plague or 'The Black Death**:'

(1) of all these diseases, plague was the biggest killer, from its first visitation in 1347-48 (or its first return from Central Asia since the so-called Justinian plague of 6th-8th centuries).[14]

(2) Certainly for the medieval period, it may have been the most powerful demographic determinant, and thus justifies some considerable attention.

(3) From 1347-48, plague – whether or not bubonic, in the form we know it today – remained endemic in Europe and its last known occurrence in western Europe was in Messina (NE Sicily), in 1733, when over 48,000 died from the plague; [15]

(4) but plague continued to produce mortalities in eastern Europe: in the Russian and Ottoman (Turkish)

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[13] E. A. Wrigley, R.S. Davies, J.E. Oeppen, and R. S. Schofield, *English Population History from Family Reconstitution*, Cambridge Studies in Population, Economy and Society in Past Time no. 32 (Cambridge and New York: Cambridge University Press, 1997). See also E. A. Wrigley, 'The Growth of Population in Eighteenth-Century England: A Conundrum Resolved', *Past & Present*, no. 98 (1983); and E. A. Wrigley, 'Explaining the Rise in Marital Fertility in England in the 'Long' Eighteenth Century', *The Economic History Review*, 2nd ser., 51:3 (August 1998), 435-64, in which he contends that the major factor may have been a decline in stillbirths: '*ceteris paribus* a fall in the number of conceptions which end in a stillbirth will cause a comparable rise in the number of live births'. Implicitly, that lends support to those arguing that a fall in mortality was the key. Even more recent is E. Anthony Wrigley, 'British Population during the "Long" Eighteenth Century, 1680 - 1840', in Roderick Floud and Paul Johnson, eds., *Cambridge Economic History of Modern Britain*, 3 vols. (Cambridge and New York: Cambridge University Press, 2004), Vol I: *Industrialization, 1700 - 1860*, pp. 67-95.

[14] So-called not only because it became widespread during the reign of the Emperor Justinian (527-65), from at least 541 CE, but more so because it was so accurately described in the chronicles of the Byzantine historian Procopius (499-565), whom Justinian had appointed as Prefect of Constantinople in 562. See Lester E. Little, ed., *Plague and the End of Antiquity: the Pandemic of 541 - 750* (Cambridge and New York: Cambridge University Press, 2007).

[15] The traditional literature, to this day, however, wrongly states that plague came to an end in Western Europe with the Marseilles outbreak, in 1719-20.

Empires until the 1820s.

(5) There were three forms of plague, as follows:

iv) **Biological Forms of Plague:** three major forms, according to currently accepted medical and historical opinion, which, however, I shall challenge later. But first the orthodox view:

(1) **Bubonic Plague:** with mortalities of 60% - 80% of its victims

- the late-medieval Black Death (1347/8 - 1352) may have killed 40% of Europe's population, or more.
- It was supposedly caused by the plague bacillus (bacteria) known as *Yersinia pestis* (previously known as *Pasteurella pestis*),
- supposedly carried by certain types of blood-sucking fleas (*Xenopsylla cheopis*, *Nosopsyllus fasciatus*) that were parasitic on rats, especially black rats,
- these fleas normally do not attack humans so long as an ample supply of rats remains (i.e., remain alive to serve as hosts for the fleas);[16]
- but the plague bacillus may also be carried by fleas (*Pulex irritans)* that feed on humans, as well as other animals: though medical authorities still dispute their significance, contending that *Pulex irritans* is not that effective carrier ('vector') of the plague bacillus.[17]
- Note: the British, and the English-speaking world, believe, from British medical experience in India, that all bubonic plague was transmitted by rat-fleas;
- but the French, from their experience in North Africa, believe that human fleas were the chief carrier, or along with rat fleas – a view decidedly not shared and indeed still rejected by British and American demographic historians.[18]
- Bubonic plague, however transmitted, has been the most common form of plague, though this may not have been true of the late-medieval plagues – though the jury is still out on this question.

(2) **Pneumonic Plague:** with mortalities of 99%:

- spread by human breath (from lung infections: evidently a mutation of bubonic plague).
- It may have been more common and widespread in medieval plagues than currently believe; and may

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[16] The bacillus *Yersinia pestis*, discovered by the Swiss -born French microbiologist Alexandre Yersin (1863-1943), in Hong Kong, in 1894, with the outbreak of the so-called Third Pandemic of this disease. Having studied at the Pasteur Institute in Paris, he founded two similar Institutes in China and developed a serum against the Plague. The First Pandemic, known as the 'Justinian Plague' (see previous note), took place during the 6th, 7th, and 8th centuries; the Second, from 1347-1720 (in Western Europe; until the 1820s in eastern Europe); the Third, from 1894 to 1947.

[17] See the various publications by Samuel Cohn, already cited, but especially Samuel K. Cohn, Jr., 'Epidemiology of the Black Death and Successive Waves of Plague', in Vivian Nutton, ed., *Pestilential Complexities: Understanding Medieval Plague*, Medical History Supplement No. 27 (London, 2008), pp. 74-100. . See also Albert L. Burroughs, 'Sylvatic Plague Studies: the Vector Efficiency of Nine Species of Fleas Compared with *Xenopsylla cheopis*', *Journal of Hygiene*, 45:3 (August 1947), 371-96. This study indicates the *Pulex irritans* may be an effective transmitter, but only if large numbers of these fleas attack their human victims.

[18] See J.N. Biraben, *Les hommes et la peste en France et dans les pays européens et méditerranées*, 2 vols. (Paris and The Hague, 1975-76).

help explain the rapid transmission of plague.

(3) **Septicaemic Plague:** perhaps mortalities of up to 90%:

- infection from the blood stream (i.e., spreading by bacteria invading cuts).
- this was a very rare form of the plague.

v) **Plague and other diseases also adversely affected birth rates,** but we shall leave that aspect of disease until we get to birth rates.

vi) **Was the Medieval 'Black Death' Really Bubonic Plague? Some counter-arguments**, inspired by the recent publication of: Samuel K. Cohn, Jr., *The Black Death Transformed: Disease and Culture in Early Renaissance Europe* (Oxford and New York: Oxford University Press, 2002).[19]

(1) The experience of British doctors in China (Hong Kong) and India, from 1894 to 1947, demonstrated that bubonic plague spread to human populations only after the bulk of the rat population in a given area had died from the plague:

- i.e., the rat flea, *Xenopysyllus Cheopis* [not known in Europe north of the Alps], carrying the plague bacillus, *Yersinia pestis*, will not bite humans unless there are no or very few rats left alive after being infected with plague.
- when the flea bites a rat host so infected the flea ingest thousands of bacilli that choke off and blocks its esophagus, preventing the blood-food from entering the stomach, and thus causing it to become frenzied with hunger
- the infected flea then bites other rats, infecting them as well.
- to repeat: when most of the rats have been killed in this fashion, then the fleas attack humans
- the fleas so infected, it must be noted, cannot live very long after their infection – because they will

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[19] See also Cohn's earlier article (included in the course reader): Samuel K. Cohn, Jr., 'The Black Death: End of a Paradigm', *American Historical Review*, 107:3 (June 2002), 703-36. See also Cohn, 'Epidemiology of the Black Death', pp. 74-100 (cited in full in n. 17). An even more recent publication staunchly upholds the traditional orthodoxy, about the rat-flea transmission of *Yersinia pestis:* Ole J. Benedictow, *The Black Death, 1346 - 1353: The Complete History* (New York: Boydell Press, 2004). How does he deal with Cohn's arguments? By simply ignoring them. An even more recent book ignores both sets of publications, those of Cohn and Benedictiow: Stuart J. Borsch, *The Black Death in Egypt and England: a Comparative Study* (Austin: University of Texas Press, 2005). Yet he still voices doubts that the Black Death was actually bubonic plague as known today, suggesting that the disease underwent biological mutations. The most recent publications on this topic contend that the late-medieval Black Death was indeed bubonic plague, i.e., from *Yersinia pestis:* but appearing in a form far different from the contemporary plague. See John Kelly, *The Great Mortality: An Intimate History of the Black Death, the Most Devastating Plague of All Time* (New York: Harper Collins, 2005), 'Afterword: The Plague Deniers', pp. 295-303: a response to Cohn; and, most recently, John Theilmann and Frances Cate, 'A Plague of Plagues: The Problem of Plague Diagnosis in Medieval England', *Journal of Interdisciplinary History*, 37:3 (Winter 2007), 371-93 (also in the new course reader). But neither fully answers and responds to crucial problems posed by Cohn: especially on how the plague bacillus was so rapidly and so completely transmitted across western Europe, if it was spread by rat fleas, as in the Third Pandemic. Alternatively, the plague may have been primarily pneumonic (spread by human breath, sputum); but Cohn strongly denies this possibility, stating that pneumonic plague is very rare, and that it always begins with bubonic plague. See also n. 27 below.

soon starve to death: on average, within 4-5 days of becoming 'blocked'.[20]

(2) **The crucial problem therefore is that:**

- not a single medieval chronicle or document or any other form of witness (e.g., paintings) ever refers to dead rats, or indeed even any rats; and yet how could the mass death of rats before the death of humans go unobserved??
- while every Hindu villager in the early 20th century realized that plague was coming to their village once they saw so many hundreds or more dead rats lying on the roads.[21]

(3) Furthermore, because the modern form of bubonic plague can be spread only by bites from infected fleas, its mortality was very low – no more than 5% - 10% (depending on the region), and generally much less virulent. Thus,

- relatives and friends who visited plague victims in Chinese and Indian hospitals rarely caught the plague – and again, only if bitten by plague-infected fleas.
- but the Medieval Black Death, as noted, had horrendous mortalities - up to 40% or more
- those who came into contact with plague victims, still alive, or dead, in later medieval Europe, very frequently, indeed generally, then fell victim to the disease
- therefore, the Black Death was an extremely contagious disease, so contagious that it could not have been spread by fleas, in the fashion witnessed in the 20th century.

(4) 20th century studies of bubonic plague have noted that it generally followed the routes of the grain trade, with many victims in the area of granaries (grain storage facilities):

- for the simple reason that rats feed upon grain and generally live near grain supplies
- but there is no medieval evidence indicating that victims of the Black Death were in the vicinity of granaries.

(5) Rats, it must be noted, are not very mobile, and in their lifetimes rarely go more than a few miles (kilometres) from the their birth place.

- Cohn and others have noted the very slow transmission of plague from 1894 to 1947 (stating that it took 40 years to come down the Yangtze river delta).
- but the medieval Black Death spread like wildfire: how could it have done so?
- Remember once more that a plague infected flea, with its esophagus cut, lives for only a few days
- though some scientists now say that not all plague-infected fleas suffer a complete blockage to their esophagus and thus not do die so quickly:
- in any event, the common notion that dormant fleas, infected with *Yerinsia pestis*, could have been transported across medieval Europe in bales of textiles, etc., lacks merit.

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[20] Burroughs, 'Sylvatic Plague Studies', p. 384, states an average of 2-3 days [for *Nosopsyllus fasciatus]*; but on p. 390, the author states: 'The average survival time [for *Xenopsylla cheopis*] after having been blocked was 4 .4 days, with a minimum of 1 day and a maximum of 17 days.'

[21] A commonly expressed retort to this argument is that medieval society was so used to the presence of rats that chroniclers would ignore them. Perhaps live rats – but surely they would comment on the sudden mass death of thousands of rats in the streets of their cities!!

(7) Note: a supposed transmission of the plague bacillus (*Yersinia pestis*) by eggs deposited by female fleas, which are then transported to some other place, where the eggs become larvae, fleas within a cocoon, and then adult fleas is not biologically possible:

- because infected fleas, having engorged the plague bacilli in their esophagus [see above] cannot infect, cannot transmit the bacilli, to their eggs.
- as also noted, such plague-infected 'blocked' fleas die soon after (in about 4 days, on average).

(8) According to Albert Burroughs (*Journal of Hygiene*), there are four standard means by which plague-bacillus laden fleas will transmit plague to it victims: [direct quotation]:[22]

(1) By the blocked flea's serving as a biological vector.

(2) Mechanical transmission, which undoubtedly is of considerable importance during an epizootic.

(3) By scratching the infected flea or its faeces into the human's skin.

(4) By the ingestion of fleas harbouring plague bacilli.

- 'Infection by the latter two methods is undoubtedly rare and of minor importance.'

(9) So, therefore, what was the medieval Black Death?

- Cohn replies that after studying hundreds of medical texts and treatises, including medieval treatises, he cannot answer that question,
- other than arguing that was an unusually virulent and unusually contagious disease – one that could not have been spread by rat fleas.
- nor can I answer that most intriguing questions: some historical questions do not have answers.

(10) Some other historians, having entertained the same doubts, suggest that it might have been anthrax -- but few accept that view (a view that Cohn also rejects).[23]

(11) Could the medieval Black Death than have been pneumonic plague?

- Cohn argues that in modern times, pneumonic plague is always a secondary manifestation of bubonic plague, and not an independent phenomenon
- While the Justinian and Medieval plagues did mean the infection of the lymphatic system – and did involve the buboes ['inflamed swelling in the glandular part, esp. groin or armpit': OED] the physical descriptions of the areas infected in the late-medieval and 20th century plagues are very different, especially in the locations of the infected areas.[24]

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[22] Albert L. Burroughs, 'Sylvatic Plague Studies: the Vector Efficiency of Nine Species of Fleas Compared with *Xenopsylla cheopis*', *Journal of Hygiene*, 45:3 (August 1947), 394.

[23] See Graham Twigg, *The Black Death: A Biological Reappraisal* (New York, 1985).

[24] See Procopius's description of the plague in the reign of Justinian (527-65), about the year 562 CE: 'But on the same day in some cases, in others on the following day, a bubonic swelling developed; and this took place not only in the particular part of the body which is called "boubon" [βουβών : i.e., the groin], that is below the abdomen, but also inside the armpit, and in some cases also besides the ears, and at different points on the thighs'; and further: 'Now some of the physicians who were at a loss because the symptoms were not understood, supposing that the disease centred in the bubonic [βουβϖσιν] swellings, decided to investigate the bodies of the dead. And upon opening some of the swellings, they found a strange sort of carbuncle that had grown inside them. Death came in some cases immediately, in others after many days;

(12) The most recent studies, by John Kelly (a monograph), the team of biological historians, John Theilmann and Frances Cate, and by Lester K. Little: all contend that the late-medieval Black Death was indeed bubonic plague – *Yersinia pestis* (as recent DNA tests of late-medieval bones seem to indicate:[25]

- but a plague that manifested itself in a form far different from that of contemporary plagues
- and thus, they speculate: the modern form of *Yersinia pestis* is a much mutated bacillus
- they do not, however, satisfactorily explain how the medieval Black Death was transmitted
- Kelly's own theory – that another rodent, the marmot, was responsible -- seems unconvincing, at least to me.

(13) Recent study by Barney Sloane, *The Black Death in London*: in his press interview:[26]

- he stated that rats could not have been the carriers of the Black Death in London, in 1348-9: 'We ought to be finding great heaps of dead rats in all the waterfront sites, but they just aren't there'
- 'all the evidence suggests [that] the plague spread to fast for the traditional explanation of transmission by rats and fleas'
- 'it has to be person to person: there just was not time for the rats to be spreading it'
- also mortality rose in bitterly cold winter when rat fleas could not have survived.
- estimates that the mortality in London 'could have been as high as two-thirds'.

(14) Summary: the causes of and the transmission of the medieval Black Death remain a mystery to be fully resolved, though there is now DNA evidence for *Yersinia pestis* in 14th-century plague victims (skeletal remains).[27]

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and with some the body broke out with black pustules as large as a lentil and these did not survive even one day, but all succumbed immediately'. H.B. Dewing, ed., and trans., *Procopius: History of the Wars, Books 1 - II* (Harvard University Press, 1961), pp. 457-58, 462-63 . Procopius also makes no mention of rats in his vivid and detailed description of the plague. See also n. 9 above.

[25] See n. 12, above. For Cohn's most recent article on this subject, but concerning early-modern Italy, only, see: Samuel K. Cohn, Jr., and Guido Alfani, 'Households and Plague in Early Modern Italy', *Journal of Interdisciplinary History*, 38:2 (Autumn 2007), 177-205. These early modern plagues were remarkably similar to the late-medieval Black Death – and thus still very different from the Third Pandemic or 1897-1947.

[26] Barney Sloane, *The Black Death in London* (London: The History Press, 2011). Interview reported in the *Guardian* and reprinted in the *Toronto Star*, 17 Aug. 2011.

[27] Finally, recent scientific studies indicates the presence of DNA for *Yersinia pestis* in some late-medieval skeletal remains. See Stephanie Haensch, Raffaela Bianucci, Michel Signoli, Minoariso Rajerison, Michael Schultz, Sacha Kacki, Marco Vermunt, Darlene Weston, Derek Hurst, Mark Achtman, Elisabeth Carniel, and Barbara Bramanti, 'Distinct Clones of *Yersinia pestis* Caused the Black Death', *Proceedings of the Library of Science: Pathogens*: 6:10 (Oct. 2010), 1- 8: e1001134. doi:10.1371/journal.ppat.1001134.; G. Morelli et al., 'Yersinia pestis genome sequencing identifies patterns of global phylogenetic diversity', *Nature Genetics*, 42:12 (Dec 2010), 1140-41: online version; Verena J. Schuenemann, Kirsten Bos, Sharon DeWitte, Sarah Schmedes, Joslyn Jamieson, Alissa Mittnik,Stephen Forrest, Brian K. Coombes, James W. Wood, David J. D. Earn, William White, Johannes Krause,and Hendrik N. Poinar, Targeted enrichment of ancient pathogens yielding the pPCP1 plasmid of Yersinia pestis from victims of the Black Death', *Proceedings of the National Academy of Sciences of the United States of America*: 108: 38 (Sept. 2011): online version, August 2011, pp. 1-7 [http://www.pnas.org/content/108/38/E746]; and, most recently,

(15) For the very latest, read Lester Little, 'Plague Historians in Lab Coats: A Review Article', *Past & Present*, no. 213 (November 2011), pp. 267-90.

e) **Warfare**:

In pre-industrial times, warfare was itself a very minor killer indeed:

(1) Medieval and early-modern wars were really very small scale and not so lethal;

(2) and the relatively few battle deaths hardly dented the population.

(3) Far more combatants died of disease during war -- especially from infected wounds, or from consuming contaminated food and water (often contaminated by rotting bodies -- human and animal).

ii) **Warfare similarly had its major demographic impact in its secondary consequences:**

(1) in causing famines, by destroying farmlands, disrupting food distribution,

(2) and especially in spreading diseases, from both the dead and wounded.

(3) That was especially true when endemic warfare spread across Europe for such long periods, with the breakdown of central authorities, anarchy, local civil wars, brigandage, and looting by unpaid armies; and also piracy, disrupting fishing and sea trade.

(4) Western Europe and the Mediterranean basin suffered such a spreading stain or prolonged, protracted, and disruptive warfare from the 1290s -- following almost a century of relative peace -- and that warfare fed into the more famous Hundred Years' War (1337-1453).

iii) **Warfare was perhaps the major means of spreading diseases for the same reasons:**

(1) infections from rotting dead bodies, from the flight of infected persons, from the flight of plague-bearing rats; from pollution of food and especially the water-supplies.

(2) Note: water-purification systems were major cause of the dramatic fall in mortality, both in Europe and North America, from the later 19th century.[28]

(3) But only after 1876, when the German scientist Robert Koch (1843-1910) had discovered:

- that a certain strain of bacteria was responsible for the transmission of the animal and human disease known as anthrax;
- and in the early 1880s, he also discovered the bacilli for tuberculosis and cholera.
- For these discoveries, he won the Nobel prize in 1905.

Michael Knapp, 'The Next Generation of Genetic Investigations into the Black Death', *Proceedings of the National Academy of Sciences of the United States of America*, 108: 38 (September 2011), 15569-15670. Online version, 20 Sept 2011: http://www.pnas.org/content/108/38/15669.full.pdf+html; and Lester K. Little, 'Plague Historians in Lab Coats: A Review Article', *Past & Present*, no. 213 (November 2011), pp. 267-90.

[28] 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; and also Michael Haines, 'The Urban Mortality Transition in the United States, 1800-1940', *Annales de démographie historique*, 101:1 (2001), 33-64.

(4) Two years later, in 1878, the French scientist Louis Pasteur published a paper:[29]

- to demonstrate the harmful effects of various micro-organisms in milk and various other beverages;
- and that discovery led to the famous 'pasteurization' process of heating milk in order to kill the harmful bacteria that it contained.

(5) But above all the equally harmful impact of warfare came via the mechanism of malnutrition, as just discussed: i.e., from the disruptions of the food supplies.

(5) Warfare, obviously, also a strongly related and strongly negative impact of the real incomes and living standards of the lower strata of society:

- from often horrendous inflationary coinage debasements (when wages did not keep pace with prices): to be explained in the next topic, on MONEY
- from exorbitant increases in highly regressive taxes: excise taxes on the consumption of basic foodstuffs
- NOTE: the taxes were not levied to pay directly for wars, but rather to pay the costs of public borrowing, which (in the form of loans and *rentes* – annuities) was the chief agency of financing medieval and early modern warfare.[30]

f) **Famines**:

i) **While famines were indeed very frequent occurrences in medieval and early-modern Europe,** very few people actually starved to death.

(1) The major exception was the famous European Famine of 1315-17 [sometimes given as: 1315 - 22],

- which happened to coincide indeed with the peak of medieval Europe's population growth,
- and is thus often cited as direct evidence of a Malthusian crisis.

(2) But in fact that particular famine, and many others as well, were caused not by overpopulation but by terribly bad and destructive weather.

(3) The other major cause of famines was of course warfare -- in destroying farmlands, disrupting the grain trade, sacking of granaries, etc.

ii) **Problems with the food supply**: or insufficient food in general, resulted in rising mortality rates in more indirect ways than outright starvation:

(1) in the form of widespread malnutrition, which reduced resistance to diseases (or provided traumatic

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[29] See the website for Louis Pasteur et l'Institut Pastereur: http://www.pasteur.fr/pasteur/histoire/histoireUS/index.html. The other agent transmitting disease is of course the virus. For this, see *Answers.com*, on the internet: 'The existence of submicroscopic infectious agents was suspected by the end of the 19th cent.; in 1892 the Russian botanist Dimitri Iwanowski showed that the sap from tobacco plants infected with mosaic disease, even after being passed through a porcelain filter known to retain all bacteria, contained an agent that could infect other tobacco plants. In 1900 a similarly filterable agent was reported for foot-and-mouth disease of cattle. In 1935 the American virologist W. M. Stanley crystallized tobacco mosaic virus; for that work Stanley shared the 1946 Nobel Prize in Chemistry with J. H. Northrup and J. B. Summer'.

[30] This important subject will be treated in greater depth in the final topic for this term: on medieval banking and finance.

shocks to the system -- heart failure).

(2) That view is, however, disputed by several historians, for European demography in general.

(3) Whether mortality from the late-medieval plagues was increased by such conditions of malnutrition is still also a matter of dispute,

- though certainly death rates were highest amongst the very old, the very young and weak,
- and also the very poor -- so that one eminent historian [Cazelles] has called the Black Death the 'proletarian plague'.

iii) **Thus the Four Horsemen of the Apocalypse**: War, Plague, Famine, and Death

g) **Infant Mortality and Life Expectancy:**

i) **A common way of expressing mortality, and especially to dramatize the high mortalities of medieval Europe,**

(1) is in terms of life expectancy,

(2) which is approximately the reciprocal of the death rate (up to the 70s):

(3) and for most of late-medieval and even much of early-modern Europe, the life expectancy was about 35.

ii) **Now a common error with such life expectancies is to suppose that people typically died in their mid 30s;**

- but that is false, because life expectancy is measured from birth,
- and it is symbolically expressed as: e_0 [Life expectancy from age 20 is: e_{20}]

iii) **Extremely high infant mortalities is therefore the chief explanation for such low life expectancy statistics:**

iv) **less than half of all newly born infants could expect to survive into their late teens,** into adulthood.

v) **But those who survived the earlier and deadly years of childhood,** would then enjoy a much longer life expectancy; and one surviving into the 20s could thus achieve a life expectancy more approximating our own (if admittedly lower -- perhaps into the 60s).

vi) **Infant mortality, surprisingly enough, does not seem to be related to economic well-being;**

(1) for almost all studies show that infant mortality rates were as high for the rich as for the poor;

(2) and some studies show that the aristocracy often suffered even higher rates of infant mortality;

(3) perhaps because noble ladies did not breast- feed, and left that task to wet nurses;

- please note well that if the mother breast-feeds her own baby, she provides the baby with certain immunities not found in other milk
- including those of wet-nurses (with a different biology).

vi) **maternal mortality:**

(1) i.e., the death of mothers on giving birth, or shortly after: was obviously far higher than today;

(2) but when we first have some useful statistics, in the 17th century England, the rate of maternal mortality

does not seem ever to have exceeded 10% of those giving birth.[31]

(3) More recently, Anthony Wrigley has shown that maternal mortality rates fell from 16.3/1000 (i.e. 1.63%) in the second half of the 17th century to just 5.8/1000 in the early 19th century.[32]

g) **The Birth Rate**: **as Influenced by Famine, Malnutrition, Disease**:

We must also see that these factors could depress the birth rate as well as raise the death rate: and thus a doubly depressing effect.

i) **first, high mortality itself could depress the birth rate**:

(1) by killing so many infants or young people before they could exercise their reproductive powers, thus creating for the next generation a so-called 'hollow' or depression in the birth rate (i.e., because they were not there to reproduce).

(2) We believe that the late-medieval and early-modern bubonic plagues exacted by far their heaviest toll on infants and the very young, thus producing these low birth rates.

(3) This can be seen in the Net Reproduction Rate, as the best measure of fertility: namely, the number of daughters eventually born to a class of girl babies by the end of their normal child-bearing years -- about 30-35 in this society.

ii) **Amenorrhea**:

(1) the disruption of the female menstrual cycle, as the result of malnutrition, disease (especially plague), or bodily or traumatic (emotional) shock.

(2) The effect is to prevent or delay conception.

iii) **Infertility**: temporary or even permanent.

(1) This was frequently the consequence of disabling diseases that did not kill;

(2) and many survivors of bubonic plague were infertile, either temporarily or more often permanently.

iv) **Nevertheless many demographic historians contend the contrary:**

(1) that plagues were followed by a rise in the birth rate, because the survivors were so anxious to replenish their lost families.

(2) It has also been argued that natural abortions promoted by traumatic shocks may have rendered the female more fertile, in the short run.

(3) Obviously there is no real consensus on this issue of plague and births.

h) **The Birth Rate and Social Factors:**

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[31] See Roger S. Schofield, 'Did the Mothers Really Die? Three Centuries of Maternal Mortality in 'The World We Have Lost', in L.R. Bonfield, R.M. Smith, and K. Wrightson, eds., *The World We Have Gained: Histories of Population and Social Structure* (Oxford, 1986); and Jan de Vries, 'Population', in Thomas A. Brady, jr., Heiko O. Oberman, and James D. Tracy, eds., *Handbook of European History, 1400-1600: Late Middle Ages, Renaissance and Reformation*, Vol. I: *Structures and Assertions* (Leiden/New York/Cologne: E.J. Brill, 1994), pp. 1 - 50.

[32] E. Anthony Wrigley, 'British Population during the "Long" Eighteenth Century, 1680 - 1840', in Roderick Floud and Paul Johnson, eds., *Cambridge Economic History of Modern Britain*, 3 vols. (Cambridge and New York: Cambridge University Press, 2004), Vol I: *Industrialization, 1700 - 1860*, Table 3.8, p. 83

i) we can really understand changes in European birth rates only in terms of social patterns on marriage, and related issues of contraception.

ii) So we now turn to one of the most fascinating issues in European economic and social history concerning historical changes in birth rates: The European Marriage Pattern, a concept of the British sociologist John Hajnal (of Hungarian origin): first published in 1965; and amended in 1983.[33]

7. The European Marriage Pattern:

a) **No discussion of European demographic changes can be complete without considering what Hajnal has called 'the European Marriage Pattern' [EMP]**. To quote Hajnal:

> The marriage pattern of most of Europe [except the south-east and Slavic east] as it existed for at least two centuries up to 1940 was, so far as we can tell, unique... There is no known example of a population of non-European civilization which has had a similar pattern.

b) **According to Hajnal, there are two key features to the EMP**:

i) **in terms of nuptiality: a relatively high age of first marriage, especially for women**: from the mid to late 20s, or even the early 30s.

ii) **in terms of celibacy: a significant proportion of people who never marry at all**: from 15% to 30% remaining single. **N.B**. do not confuse celibacy with chastity.

(1) Celibacy may be related to the average age of first marriage, simply in that if:

- it becomes customary for people, especially women, to wait longer before marrying, some will obviously end up never marrying,
- if only because older men tend to marry younger women, or vice versa;
- and the longer the postponement, the fewer will be the available men to marry.

(2) But this is not a hard and fast relationship:

- some studies for early-modern Europe show that celibacy rates can rise or fall independently of the average age of first marriage,
- and sometimes they moved in a contrary fashion.

(3) Such studies also indicate that celibacy rather than nuptiality (i.e., marriage age rates) is the more powerful demographic determinant.

c) **Marriage in older and non-European Societies**: **the Universal Marriage Pattern**

in ancient, Roman, and medieval European societies, and indeed in all other modern non-European civilizations, we find on the contrary:

(1) that most women did get married; and,

(2) furthermore, that most of them married at a very early age: by the later teens or around 20

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[33] John Hajnal, 'European Marriage Patterns in Perspective', in D.V. Glass and D.E.C. Eversely, eds., *Population in History: Essays in Historical Demography* (London, 1965), pp. 101-46. John Hajnal, 'Two Kinds of Pre-Industrial Household Formation Systems', in Richard Wall, Jean Robin, and Peter Laslett, eds., *Family Forms in Historic Europe* , Cambridge Group for the History of Population and Social Structure (London, 1983), pp. 65-104.

(3) men, however, generally married at a much older age: and men do not count in this model

ii) **Thus the typical non-European or Universal Marriage Pattern meant:**

(1) almost universal female marriage,

(2) at a universally early age, and usually by 20.

iii) **Demographic consequences**: high vs low pressure systems

(1) Since women are most fertile at this age, this universal marriage pattern, with virtually all women married young, meant a continuous state of high birth rates;

(2) birth rates would be affected only by the state of nutrition and medical conditions: i.e., birth rates could fall with malnutrition and disease (to be discussed later).

(3) This is also known as a High Pressure Demographic System: one dominated by mortality

(4) and conversely, the European Marriage Pattern is known as a Low Pressure Demographic System: conversely, one dominated by nuptiality and fertility.

d) **When did the European Marriage Pattern emerge?**

i) **Though evidently not Roman or early medieval,** and not widespread during what may be called the central or High Middle Ages, the EMP predates modern industrial society in Western Europe.

ii) **Hajnal himself, initially,** placed its origins in the later 16th or 17th centuries;

iii) **But some historians have recently suggested that in England** this pattern may have developed from the later 14th or 15th centuries: but the evidence is far from being convincing.

(1) i.e., the late Middle Ages, in at least northern if not Mediterranean Europe

(2) In particular see the posted graph for women in Tuscany (Florence), in 1427, fully demonstrating that a Universal Marriage Pattern then prevailed.

e) **What are its origins?** We have no real idea what brought about this European marriage pattern. i) **We may speculate that it is related to differences in family structures: that is, its emergence may be related to the development of nuclear families,** containing

(1) just the father, mother, and children;

(2) as opposed to non-European joint or extended family structures,

- in which grandparents and families of brothers and/or sisters also lived under same roof
- and that seems to have been the case for much of medieval Europe as well.

ii) **In the European nuclear system, children commonly would not marry until they could establish their own independent livelihoods,** establish their own separate homes and families (nuclear).

iii) **In rural peasant society, in early modern Europe,**

(1) that usually meant waiting until they inherited land (or managed to buy land) to set up own farming homestead.

(2) In medieval extended households, the father often transferred control of the peasant holding to the son or sons, who would then provide for him in the same household.

iv) **Service in Husbandry and the emergence of the European Marriage Pattern, with the nuclear family**

(1) both the nuclear family and the emergence of the European Marriage Pattern may be related to the development of another agrarian social institution that appears to develop first in later-medieval England;

(2) It is known as 'service in husbandry', which must not be confused with the role of traditional servants in upper-class households.

(3) In England, Service in Husbandry, as an institution, may developed after the Black Death, in response to a severe labour scarcity: i.e., as a mechanism to acquire relatively cheap agricultural labour, with such a scarcity.

(4) But it can also be found elsewhere in early-modern Europe, even when and where there was no such labour scarcity.

v) **Characteristics of In-Service, or Service in Husbandry**:

(1) young women (and sometimes men), of the middle and lower classes, hired themselves out annually

- to work chiefly as agricultural workers or servants in some other farm-household,
- living there with room and board as members of that family, while working as labourers, etc.

(2) Their pay, therefore, was

- partly in kind: in board (i.e., food) and room and clothing;
- and partly in money, usually with a lump sum cash payment at the end of the year.

(3) In this form of agricultural labour, or in-service, the prime condition of employment and residence was that these servants were not permitted to marry while in service, for obvious reasons.

(4) Such in-service provided young men and women with the means of acquiring

- often considerable sums of capital before establishing their own independent households,
- thus allowing them to acquire land – for women, the equivalent of a large dowry.

(5) Consequently, the length of service in husbandry would directly affect mean age of first marriages, especially important for women.

(6) Indeed, in his 1983 essay and revision of his views, Hajnal, having been deeply influenced by a Ph.D. dissertation written by Anne Kussmaul, a graduate student in our own Economics Department, at the University of Toronto (which she subsequently published as a book), which placed very strong emphasis upon the crucial role of this institution in the evolution of the European Marriage Pattern.[34]

(7) Hajnal now argued that the essential difference between western European and Asian households (i.e., pre 20th century) was not their overall size, when one includes servants in the western household,

- but rather the nature of service itself:
- i.e., that western European servants, unlike the collateral relatives in an Asian household who functioned as servants, were not allowed to marry and procreate while in service.

f) **The economic aspect**: real-income effects on first age of marriage for women.

i) **Both institutions, the nuclear family and in-service,** also suggest the possibility of yet a third factor influencing the European marriage pattern: that the average age of first marriage may have been strongly influenced by either past or current economic circumstances.

ii) **Thus in times of expanding new settlements, and in good times, with a higher demand for employment,**

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[34] Ann Kussmaul, *Servants in Husbandry in Early Modern England* (Cambridge, 1981).

(1) people would leave in-service at an earlier age, and marry at an earlier age;
(2) while in hard or depressed times, people would postpone marriage,
(3) or indeed end up not marrying at all.
iii) **With low life expectancies in pre-industrial times,** and the common tendency for older men to marry younger women, marriage postponement could mean no marriages (i.e., that women were left without men to marry them), as I suggested earlier.
g) **Disagreements:**
i) **I must note in passing that Ralph Davis disputes this correlation:**
(1) between economic circumstances and age of marriage;
(2) and he also disputes the significance of the European Marriage Pattern itself in historical demography;
ii) **Other historians -- Wrigley, de Vries, and Clay in particular -- however, have demonstrated some definite correlation between real incomes, wealth, and age of marriage**
iii) **I will come back to this evidence at the beginning of the second term,** when we look at the population of early modern Europe, from ca. 1520 to ca. 1750
h) **Summary of Major Components and determining factors in the European Marriage Pattern: hereafter referred to as the EMP**
i) **Nuptiality:** very late average age of first marriage for women: in the late 20s
ii) **Celibacy:** significant proportion of women who never marry at all
iii) **Nuclear Family:** European Marriage Pattern generally found only in nuclear families – with father, mother, children – rather than in extended stem families – with grandparents and other relatives (cousins, etc).
iv) **Connection with Service in Husbandry:** especially with live-in agricultural service by young women, from mid teens to mid-20s.
v) **Economic Factors: especially related to nuptiality**
(1) Average age of first marriage tended to be related to levels of real income and real wealth:

- so that rising real incomes, and increases in wealth assets, permitted and promoted earlier marriages – first marriages for women
- even increased employment opportunities would so
- conversely, unemployment and falling real incomes tended to postpone the average age of first marriages for women (and might have increased the extent of celibacy

(2) Link to Service in Husbandry:

- in particular, better alternative employment opportunities for women led to a reduction in the age at which women quit Service in Husbandry (and to the decline of the institution itself)
- and thus again promoted an earlier age of first marriage for women, and probably also a reduction in the extent of celibacy.

(i) **Significance of the EMP for the Birth Rate**:
i) **The difference between 'high pressure' and 'low pressure' demographic regimes**
(1) *high pressure regimes:*

- a society in which demographic changes are largely determined by mortality factors, with very high

death and birth rates,

- but with death rates that fluctuate much more than do birth rates,
- the birth rates are often near their biological maximum (about 40/1000)
- Thus such 'high pressure' regimes are those with the universal marriage pattern

(2) *low pressure regimes:*

- a society in which demographic changes are determined largely by nuptiality and fertility, with much lower death and birth rates;
- but, in contrast with 'high pressure' regimes, the 'low pressure' regimes have birth rates that fluctuate much more widely (normally) than do the death rates.
- Thus 'low pressure' regimes are those with the European Marriage Pattern

ii) **Rapid demographic growth can really occur only with the European Marriage Pattern**

(1) with the contrasting Universal Marriage Pattern, in which virtually all women marry and are married by the late teens, their most fertile period, the birth rate is already at a biological maximum

(2) The only factors affecting birth rates would be those influencing fertility or fecundability, through better (or worse) nutrition and resistance to disease

(3) Otherwise population growth will normally occur only with a fall in death rates.

iii) **With the European marriage pattern, birth rates have a powerful influence,**

(1) **because in an age of low life expectancies,** the later the age of first marriage, the less time there remained for procreation (and greater likelihood of death at childbirth).

(2) **But even more important, fertility and especially female fertility (or fecundity),** after having reached a peak in the early to mid-20s, then declines, and later declines sharply:

(3) see Table 2 in Jan de Vries' chapter on 'Population' in Brady, Oberman, & Tracy, eds., *Handbook of European History, 1400 - 1600*, Vol. I (1994), p. 24, for 17th-century England;

(4) and these findings are also borne out by recent Canadian studies:

- from age 20-24 to 35-39, the birth rate falls by 39.4% : from 409 per thousand to 248
- for the age group 40-44, the birth rate is 69.1% lower than in the 20-24 cohort.

(5) Our most recent evidence comes again from the renowned Cambridge demographic historian, Anthony Wrigley, whose table I have reproduced here, covering the period from the late 17th century to the first phase of the Industrial Revolution:

Age Specific Marital Fertility Rates per 1,000 women-years lived and Total Marital Fertility Rates in England

Periods/Ages	**1680-1729**	**1730-1779**	**1780-1829**
15-19	315	430	532
20-24	410	418	429

Periods/Ages	1680-1729	1730-1779	1780-1829
25-29	366	364	390
30-34	315	314	312
35-39	240	254	255
40-44	111	134	148
45-49	22	22	23
TMF 20-49	7.32	7.53	7.79
TMF 15-49	8.9	9.68	10.45

Source: E. Anthony Wrigley, 'British Population during the "Long" Eighteenth Century, 1680 - 1840', in Roderick Floud and Paul Johnson, eds., *Cambridge Economic History of Modern Britain*, 3 vols. (Cambridge and New York: Cambridge University Press, 2004), Vol I: *Industrialization, 1700 - 1860*, Table 3.2, p. 70.

iv) **age and miscarriages:** Furthermore, according to a current Canadian study**,** the miscarriage rate amongst fertile women is 50% in their mid-30s than in their mid-20s.

v) **The Goldstone critique (based also on work of other historians of China):**[35]

(1) While fully conceding that the Universal Marriage Pattern did indeed prevail within China, according to the model just described, nevertheless he contends that it did not constitute a 'high pressure regime', with continuously elevated birth rates, for the following reasons:

- that fertility was controlled within marriage itself, especially by frequent or chronic absences of the husband from the household
- and that the population of China does not appear to have grown any faster than that of western Europe from the 16th to 18th centuries.

(2) Some objections to the Goldstone thesis:

- he does not, however, take account of the other variable: increased mortality as a method of checking

[35] In July 2003, I served a referee and appraiser for Harvard University Press, for this manuscript submitted for publication as a monograph: Jack Goldstone, *The Happy Chance: the Rise of the West in Global Context, 1500 - 1850*. His views were heavily influenced by: Kenneth Pomeranz, *The Great Divergence: Europe, China, and the Making of the Modern World Economy* (Princeton: Princeton University Press, 2000).

population growth

- furthermore, the evidence for all his contentions is very thin, and certainly not well documented, for the whole of China in the early-modern period.
- and we really do not have reliable statistics on China's aggregate population (as opposed, say to estimates of the population in the Yangtze delta).

(3) In the footnote, you will find some recent critiques of this view:[36]

v) **Marriage Patterns in Modern-Day Asia:**[37]

(1) The Universal Marriage pattern seems to be withering away in much of Asia, especially eastern Asia, today

(2) But whether UMP or EMP prevails depends in part on the maintenance of traditional marriage customs, i.e.,

- whether marriages are arranged, especially for young women, by the parents
- whether women are or become free to marry whom they want
- or whether financially independent young women choose not to marry

(3) In Japan, and to a lesser extent in Korea, Taiwan, Hong Kong, and Bangkok (Thailand), we find some radical changes, that resemble the early-modern European marriage pattern:

- marriages are being postponed, so that the average age of first marriage for women is rising to about 30 (31-33 for men).
- consequently, as happened in western Europe, a rising proportion of women, especially Japanese women, choose never to marry at all (or cannot find husbands in their 30s): in Japan, about one third of women in the early thirties do not marry.

(4) This change is obviously the result of greater freedom for young women, and most especially the result of greater education and financial independence and security for such young women.

(5) Obvious consequence: sharply falling birth rates and demographic stagnation.

vi) **The birth rate and demographic growth**:

(1) As I have already noted, Wrigley and Schofield (1981) have argued that, from the later 17th century,

- the birth rate became decisively the more powerful factor in demographic growth: so that rising birth rates accounted for 70% and falling death rates for, therefore, only 30% of population growth from the early to mid-18th century.
- ultimately producing the demographic revolution of the 18th century, accompanying the Industrial Revolution.

(2) Shortly after their publication, David Weir (1984), subsequently supported by Schofield, has demonstrated

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[36] Ricardo Duchesne, 'Review Essay: Malthus and the Demographic Systems of Modern Europe and Imperial China: a Critique of Lee and Feng', *Review of Radical Political Economics*, 35:4 (Fall 2003), 534-52; Ricardo Duchesne, 'On the Rise of the West: Researching Kenneth Pomeranz's *Great Divergence*', *Review of Radical Political Economics,* 36:1 (Winter 2004), 52-81.

[37] Taken from 'Asia's Lonely Hearts' in *The Economist*, August 20-25 2011, p. 20; and 'The Flight From Marriage', pp. 21-24.

that in England, from the 1540s to the 1750s,

- increasing birth rates were due more to changes in the proportions of females who married than to changes in the average age of first marriages.
- i.e., due more to celibacy (never marrying) than to nuptiality (average age of first marriage).[38]

(3) As I have stressed to my Eco 303Y class, the 18th-century demographic revolution (and the Industrial Revolution itself) could not have occurred without the European Marriage Pattern.

vii) **Other factors to be considered in measuring fertility:**

- *fecundability:* the combination of female physiology (state of health, nutrition, etc.) and frequency of sexual intercourse
- *post-partum non-susceptibility:* the likelihood that the female will again become pregnant after giving birth is influenced by;
  - breast-feeding and lactation: while lactating the female is unlikely to become pregnant
  - infant mortality: if the infant dies while being breast-fed, lactation will normally cease, allowing the female again to become pregnant.
- *intrauterine mortality:* i.e., death of the fetus because of miscarriages and natural abortions
- *sterility and/or amenorrhea* (disruption of the female menstrual cycle): the effects of malnutrition, disease, or other physical trauma in preventing or in delaying conception for a long period of time.

viii) **Sexual activity and the birth rate:**

(1) Now, however, you may now well ask, what relationship does nuptiality and celibacy -- either the age of first marriage or the proportion who marry --- really have to do with normal sexual activity and the birth rate?

(2) The European Marriage Pattern would not be so powerful an influence, obviously if procreation took place outside of marriage.

(3) And in particular, what about birth control? To that subject we now turn.

(j) **Contraception, Illegitimacy, Abortion, and Infanticide**:

To repeat: in so far as ages of first marriages had a demographic impact, a later age of first marriage would mean lower birth rates only if :

(1) premarital sex was infrequent or

(2) if contraception was widely practised in premarital intercourse.

ii) **Illegitimacy:**

(1) while the medieval evidence is virtually useless, the evidence for the early-modern period indicates that, while illegitimacy certainly existed, it was not a powerful force.

(2) For the early 17th century, it may have accounted for 1% - 4% of all births, and as much as 10%, perhaps, of first births.

(3) But almost all those giving birth to illegitimate children married soon after, thus producing all the rest of

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[38] David Weir, 'Rather Never than Late: Celibacy and Age at Marriage', *Journal of Family History*, 9:4 (Winter 1984), 340-54; Roger S. Schofield, 'English Marriage Patterns Revisited', *Journal of Family History*, 10:1 (Spring 1985), 2-20.

their children within marriage.

(4) The evidence for post-marital illegitimacy (i.e., producing children with another partner in an adulterous relationship) is very slim indeed.

(5) Evidence also that illegitimacy rates varied positively with marriage (nuptiality) rates.

iii) **Contraception:**

(1) There is now some considerable evidence that contraception was practised even in medieval times,

- and was becoming much more widespread from the 16th century, especially for pre-marital sex.
- Ralph Davis (*The Rise of the Atlantic Economies)* disputes this point; but he is now out of date.

(2) Recent research shows that, from the ancient through the medieval and early modern worlds,

- abortifacients and contraceptives: there was an evidently common tradition, spread by both female folklore and by male doctors through medical treatises, of using a wide variety of plants, roots, and herbs as either contraceptives or abortifacients (i.e., to induce abortions of the fetus);
- but others contend that such plants were used to regulate menstruation rather than to induce abortions.[39]

(3) ***coitus interruptus*** **(called Onanism in the Bible):** Most historians believe that this was the most common method throughout late medieval and early modern (indeed modern) Europe.

(4) **Sodomy (aka buggery, or anal intercourse):**[40]

- David Herlihy and Christiane Klapisch-Zuber, in their *Tuscans and Their Families: A Study of the Florentine Catasto of 1427* (New Haven, 1985) contend, on the basis of frequent clerical condemnations,
- that this was an even more common, widely practised method of birth control, in late-medieval Italy at least, than was coitus interruptus.

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[39] On all this, see P. P. A. Biller, 'Birth Control in the West in the Thirteenth and Early Fourteenth Centuries', *Past and Present*, no. 94 (1982), 3-26; J.M. Riddle, 'Oral Contraceptives and Early-Term Abortifacients during Classical Antiquity and the Middle Ages', *Past & Present*, no. 132 (August 1991), 3-32; and his more recent monograph: *Contraception and Abortion from the Ancient World to the Renaissance* (Cambridge, Mass. 1992); Etienne Van de Walle, 'Flowers and Fruits: Two Thousand Years of Menstrual Regulation', *Journal of Interdisciplinary History*, 28:2 (Autumn 1997), 183-203. A criticism of the Riddle thesis on fertility controls in ancient and medieval societies.

[40] The word 'bugger' is derived from Bulgarian, in the following fashion: In the late 12th and early 13th centuries, a new Christian sect appeared and developed in Provence, in southern France, especially in the town of Albi: and hence their name 'Albigensians', also known as Cathars. Their origins were thought to be in the 'East', or the Byzantine Empire, entering Europe via then Christian Slavic kingdom of Bulgaria, where they were known as Bogomiles.. The actual origins were third century (CE) followers of the Persian teacher Mani, who were thus known as Manicheans. The Manicheans and the Albigensians believed that life on earth was a constant struggle between the forces for good (the spirit) and evil (matter, including the body). Many were rigidly ascetic, condemning marriage, procreation, and even food. Their fearful Christian neighbours came to believe rumours that, if they abstained from regular sexual intercourse, they engaged instead in anal intercourse; and hence the term 'bugger'. After the pope and the Inquisition condemned their religion as a vile heresy, most of them were slaughtered by French cavalry during the so-called Albigensian Crusade (1209-1255: ending that year when Quéribus, the last Cahar fortress, finally fell to the 'Crusaders').

(5) Use of condoms made from animal membranes (sheep), from the later 16th or 17th century.[41]

v) **Termination of life:**

(1) Physically or mechanically-induced abortions and infanticide were also practised (with less evidence), especially infanticide (if only be neglecting children after birth),

(2) but it is extremely difficult, with an obvious lack of concrete evidence, to be specific on this issue.

vi) **The Church and Contraception/Abortion**

(1) It is interesting to note that many of the early Church authorities did not consider the fetus to be a human being ('quickened with the spirit') until it had reached a certain stage, and thus did not consider early-term abortions to be homicide.

(2) But by the 12th century at the latest the Church had formulated a very strong dogma against any form of contraception, including obviously any form of abortion as well;

(3) and that anti-contraception ideology was also firmly maintained by all early-modern Protestant sects (well into this past century, the 20th).

(4) Thus, to repeat the former statement, Malthus, as a Protestant clergyman, certainly never included contraception amongst his 'moral restraints' as acceptable preventive checks.

vii) **Malthus, in recommending moral restraints in the form of a postponed or later marriage age in particular:**

(1) was really discussing the European Marriage Pattern without fully realizing how distinctive and unique it was to western Europe, from early-modern times (even if recognizing that some non-European societies had different marriage customs).

(2) Hence this prudential check of later-marriage (and abstinence) was far from being universal, and limited as a population regulator to just early-modern western Europe.

k) **Beneficial Consequences of Lower Birth Rates with the EMP**:

i) **First, it helped curb the death rate itself**: since childbirth, the danger of contracting fatal infections while giving birth, was a significant, if not really major cause of death for women.

ii) **Lower birth rates further curbed the death rate by better preserving women's health**: and indeed fewer children per family obviously meant higher living standards for that family.[42]

iii) **Thus the European Marriage Pattern meant a reduced threat of continuous overpopulation:** that prudential checks likely would prevail before subsistence crises struck.

l) **Malthus, the European Marriage Pattern, and Demographic Equilibrium:**

We can now return to Malthus to understand his concepts of demographic equilibrium, in the context of the European Marriage Pattern: consider his demographic dynamics and demographic equilibrium in the graph on the screen.

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[41] The 'famous' Italian Don Giovanni (Don Juan) reputedly used such condoms.

[42] A 15th- century Flemish proverb suggests that negative connection between large family size, poverty, and poor health: '*luttel goets ende vile kynder; dit brengt den meneghen in groten hynder*' -- many children and few goods means great trouble for most people.

ii) **Demographic equilibrium is defined by the equality of birth and death rates,** with thus a static population: equilibrium, on this graph or chart, equilibrium is indicated for each variable by an asterisk (*).
(1) If the birth rate exceeds the death rate so that population grows, population growth will depress real wages (from the equilibrium real wage Y* to the new wage Y).
(2) Falling real wages will increase the death rate and reduce the birth rate until, finally, the equilibrium of BR = DR is restored.
iii) **Self-sustained population growth in this model can occur only with a rise in the real wage:**
Now here is a crucial point: Malthus did not see population movements as autonomous.
(1) Along with many Classical economists, he argued that population grew in response to increases in the demand for labour.
(2) Thus, if, for whatever combination of factors,

- we increase the aggregate production function on the screen from the curve AB to the curve CD (shifting upwards, to the right),
- we produce a rise in the real wage (in segment A of the graph) from Y* to Y_1;
- on the other graph (B), we can see that this increase in the real wage leads to a fall in DR and a corresponding rise in BR, resulting in population growth from P* to P_2.

iv) **In this Malthusian model,** the birth rate may rise from some combination of earlier marriages and a higher proportion of the population that is economically able to marry and raise a family.
m) **Were there European Subsistence Crises?**
i) **It is perhaps significant that the one period in which Europe did show really drastic signs of a Malthusian crisis:** was around 1315-20 (i.e., time of the Great Famine).
(1) If it is true that the European Marriage Pattern emerged soon after, in 14th-century northern Europe, it may have been a cultural response to overpopulation, but a uniquely NW European one.
(2) And if that is so, that may represent the true demographic revolution in European history.
(3) Whether or not there was a Malthusian crisis around 1300, however, will be examined in greater detail, below, in the survey of European population trends from 1100 to 1550.
ii) **Was there a recurrence of a Malthusian threat, an incipient Malthusian crisis in the 16th century?**
We will examine this in more detail at the beginning of the second term, when we return to European demography, after 1500: to explain both the European demographic recovery and the population growth of the 16th and early 17th century.
iii) **We must thus approach population growth from more positive angle,** to which I now turn.

8. Population and Aggregate Demand: Economic Consequences of Demographic Changes

a) **Population, Supply, and Demand:**
i) **So far this discussion of European population change has been unduly pessimistic,**
(1) even after recognizing the beneficial effects of the unique European Marriage Pattern;
(2) and our discussion has also been too strongly oriented towards the Supply Side, with an emphasis on diminishing returns, and related issues about production costs.

ii) **But obviously population changes were also very important for demand:**

(1) if only for increasing aggregate demand, which certainly should be a distinctly positive feature about population growth.

(2) Population growth, however, for reasons already suggested, could produce contradictory results for market demand, both positive and negative, whose interaction within the market could induce further economic changes.

b) **The consequences can be seen in terms of following A, B, C, D sequences**: with some effects ultimately being swamped by others.

i) **Effect A**: **Diminishing returns and Falling Real Wages**:

(1) As we have seen, population growth should eventually lead, in a pre-industrial economy, to an adverse land:labour ratio, to diminishing marginal returns, and thus -- or so we assume -- to a fall in real wages.

(2) Falling real incomes should thus curb market demand for manufactured goods, at least by wage earners, who would obviously have to spend most of their reduced real incomes on food and housing. (3) But do keep in mind an important, indeed crucial fact about this era: most people's income did not consist of wages, or of wages alone;

- most wage earners had supplementary forms of income, especially agricultural (farm) incomes.
- very few lived by money wages alone in the medieval and even in the early modern eras.

ii) **Effect B**: **Rising Economic Rents**:

(1) For the same reasons, population growth would likely increase real incomes, in the form of economic rent,

- from those owning or controlling land, and
- likely also from those owning and utilizing capital;
- real incomes of anybody enjoying any form of economic rent (from such causes).

(2) Remember my previous observation concerning Ricardian economic rent:

- that in fact most peasants retained some share of increasing economic rents on their lands;
- that not all of those ‘rents’ were surrendered to or expropriated by the landlord.

(3) Quite possibly, therefore, increases in such real incomes in the agricultural sector may have offset any decline in real wages with in the market economy as a whole;

- and thus the aggregate demand for, say, manufactured goods might not have declined at all
- and probably rose, for the reason suggested in the following Effect C.

iii) **Effect C**: **Increasing Aggregate Demand to Produce Larger and More Efficient Markets**: in two important respects:

(1) population growth would increase aggregate demand through the sheer increase in numbers,

- provided always, of course, that this extra demand was monetized within a market economy
- that the extra number of people had monetary incomes to spend on goods and services within the market.
- That of course will also depend upon responsive changes in money and credit, to be seen in the next major topic.

(2) Population growth should provide larger, more concentrated, and thus more efficient markets,

- especially through more rapid urbanization, as the populations of towns grow more rapidly than population as whole.
- That was, in fact, one of the most important demographic features of early-modern European economic history: a rapid population growth manifesting itself in a more than proportional growth in urbanization -- in the number and size of large towns.

(3) Scale economies in marketing: the important economic point is that such larger, more concentrated urban markets growth can produce significant economies of scale in marketing.

(4) The Transactions Sector -- the commercial, marketing, and transport sector -- of the economy is perhaps the chief beneficiary from such larger markets.

- This sector is usually viewed in terms of what economists now call transaction costs: all those costs involved in transferring goods and services from the seller to the buyer -- from the final producer to the consumer.
- The application of this theory in economic history won Douglass North the Nobel Prize in Economics (with Robert Fogel, in 1993).[43]
- That means not only direct transport and marketing costs, but also the costs of negotiating contracts, market privileges, property rights -- 'protection' costs.
- We will discuss these costs at greater length in the topics on Commerce
- but for now, suffice it say that the transactions sector was subject to very large scale-economies, so that an increase in the market and sales volume could lead to a disproportionate fall in those costs.

iv) **Effect D**: **Inducements to Increased Scale and Technological Changes:**

For this aspect, we have to consider three related effects:

(1) If aggregate demand rises faster than supply, especially in terms of such rapid urbanization, population growth may have provided strong incentives to increase the scale of production,

- requiring larger capital investments and an improved technology,
- thus achieving improved efficiency through economies of larger scale production
- as well as economies of larger scale marketing.

(2) Second, and following from the first, larger markets and large economies of scale in marketing led to often dramatic reductions in transaction costs.

(3) Population growth, through the effects already noted (diminishing returns, etc) may induce or bring about

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[43] Douglass North and Robert Thomas, *The Rise of the Western World: A New Economic History* (Cambridge, 1973), pp. 71-96, 134-38; Douglass North, *Structure and Change in Economic History* (New York, 1981), chapters 1-5; Douglass North, 'Government and the Cost of Exchange in History', *Journal of Economic History*, 44 (1984), 255-64; Douglass North, 'Transaction Costs in History', *Journal of European Economic History*, 14 (1985), 557-76. See Cliometric Society, ed., *Two Pioneers of Cliometrics: Robert W. Fogel and Douglass C. North, Nobel Laureates of 1993* (Oxford, Ohio: Miami University, 1994). His co-winner, furthermore, Robert Fogel, receiving his prize essentially for his work in promoting econometrics or 'cliometrics', arguably formulated his major econometric contributions in terms of institutions as well, those governing transportation networks and slavery in particular. See also a seminal essay by one of his former students: Clyde G. Reed, 'Transactions Costs and Differential Growth in Seventeenth Century Western Europe', *Journal of Economic History*, 33 (March 1973), 177 - 90, especially pp. 180-86.

relative price changes.

- That is, population growth may increase the real costs of certain factors of production more than proportionately, more than other costs or prices;
- and those rising relative costs may provide further incentives for cost-cutting technological changes, which in turn lead to increased scale of production, with even greater efficiencies.

c) **Some conclusions: positive and negative:**

i) **Positive: Population growth in late-medieval and again in early modern Europe was not simply a case study in diminishing returns but often of increasing returns**:

(1) It meant new settlements, overseas expansion and colonization, new markets and improved market organization, significant changes in capital investments;

(2) above all, population growth often provided the necessary incentives for technological changes in all sectors of the economy, as we shall see throughout this course.

(3) These were the true and vital historical responses to the seemingly cruel law of diminishing returns: the answer to Malthus. [See graph on production possibilities and diminishing returns]

ii) **Negative: We must now, however, face a great paradox in European economic history**:

(1) If European economic and demographic growth was *not* linear, leading directly and inexorably from the 12th century into the modern Industrial Revolution; and furthermore,

(2) If Europe did experience substantial and genuine economic growth, urbanization, and industrialization in both the later medieval and early-modern periods -- in the 13th and 16th centuries in particular --

(3) why were there evident downswings between those two major periods of economic growth -- i.e.,

- during the very late Middle Ages, the 14th and 15th centuries; and then
- between the renewed growth of the 16th century and the Industrial Revolution, another hiatus in the 17th century, an era that some historians have called a 'General Crisis.'

(4) Do these negative phenomena -- of the late Middle Age and the 17th century -- mean that the combination of population and economic growth inevitably led to economic crises and contraction; i.e., were such problems endogenous to the pre-modern, pre-industrial economy?

(5) Or were such crises instead exogenous, and externally induced?

(6) Those questions will continue to plague us -- if you forgive a bad pun -- throughout this entire course:

- whether or not demographic phenomena were endogenous or exogenous;
- whether they were causes or consequences of macro-economic changes in the European economy.

9. <u>Survey of European Population Movements: the Medieval Era, 1000 - 1500</u>

a) **Medieval European Population Growth:**

i) **In medieval Europe, population had grown remarkably:** probably more than doubling from the 11th to the early 14th century, when it reached its medieval peak around 1300:

(1) for Europe as a whole, estimates of aggregate population from a low as 75-80 million to high as 100 million. See the graph once more.

(2) According to some, England and Wales may have then had a population of 6.5 to 7.0 million

- a majority of historians favour a somewhat lesser estimate of about 6 million (or 5 - 6 million);
- and as noted, however, two other historians — Bruce Campbell and Pamela Nightingale -- now contends it was only about 4.0 to perhaps 4.5 million [see n. 1 above].

(3) Most economic historians agree that this period of dramatic population growth witnessed an equally dramatic economic growth,

- in an era that is known as the 'Commercial Revolution'
- so-called, because of the dynamic forces of the combined commercial-financial sector, especially in promoting commercialized agriculture).

(4) Keep in mind that Europe began this period growth seriously underpopulated,

- so that as the economy and population grew, it enjoyed the benefits of increasing returns to labour;
- and only that would permit the creation of genuine scale economies necessary for economic growth.

(5) Therefore, virtually all of the positive aspects of population growth that I just outlined can be seen at work in promoting genuine economic growth -- and by that I mean increasing output per capita -- during these three centuries that really witnessed as well the true birth of Europe, as we now know it.

(6) By the end of this Commercial Revolution era, however, it may very be that continued population growth

- ceased to propel economic growth, and
- brought about instead an increase in relative impoverishment.

ii) **Thus, in the early 14th century, European population levelled off,** and in several documented regions population declined, sometimes quite sharply, well before the Black Death.

b) **The Demographic Picture in 1300: the onset of crisis?**

i) **So, is there concrete evidence for a demographic crisis commencing in the early 14th century?**

(1) Please understand that it is very difficult to find adequate demographic data for late medieval Europe;

(2) but population declines have been documented for these following regions:

- In England, in the county of Essex in East Anglia, according to well-documented evidence supplied by Prof. Larry Poos:[44]
- Normandy, in north-western France
- Provence (with Marseille), in south-eastern France;
- Tuscany, in north-central Italy:

(3) Tuscany is the best documented

- the demographic evidence for the city of Prato shows a decline of 30% in the urban population from 1300 to 1339;
- and a 39% decline in the surrounding rural areas;

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[44] See Lawrence R. Poos, *A Rural Society after the Black Death: Essex, 1350 - 1525* (1991), chapters 5 & 6; L. R. Poos, 'The Rural Population of Essex in the Later Middle Ages', *Economic History Review*, 2nd ser. 38 (November 1985), 515 - 30; Richard Smith, 'Human Resources', in Grenville Astill and Annie Grant, eds., *The Countryside of Medieval England* (Oxford, 1988), pp. 188-212.

- for Pistoia, the decline was about the same, 36% (to 1344).[45]
- Florence's population may have declined from about 120,000 in 1300 to just 90,000 in the late 1330s;[46]

ii) **For England itself, however, in particular for Norfolk and parts of the Midlands,** there is equally compelling evidence (from historians such as Bruce Campbell and Zvi Razi) that:

(1) various regional populations recovered from any losses suffered from the Great Famine;

(2) and continued to grow right up to the Black Death itself.[47]

ii) **Did a Malthusian crisis afflict Europe, and especially England, at the end of the 13th century or during the early 14th century,** i.e., around 1300 A.D.?

(1) Certainly many economic historians, perhaps the majority, believe that there was such a crisis of overpopulation;

- i.e., they contend that Europe's available land resources, technology -- especially agrarian technology -- and capital stock could not sustain a larger population;
- and the acknowledged leader of this group of historians is the late Prof. Michael Postan of Cambridge University.

(2) For evidence, they cite steeply rising food prices and rents, especially on small peasant holdings, falling real wages, and various signs of increased mortalities.

iii) **The peculiar problem of England and English medieval demography:**

(1) Many historians have recently argued that by 1300 the population of England and Wales had grown to 6.5 or perhaps even 7.0 million, though, as noted 5- 6 million remains the standard view.[48]

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[45] David Herlihy, *Medieval and Renaissance Pistoia, 1200 - 1430* (1967), chapters 3 - 5 (on population), pp. 55-120; and pp. 271-82. See also David Herlihy and Christiane Klapisch-Zuber, *Tuscans and Their Families* (New Haven, 1985), chapter 3, pp. 60-92. For Provence as well, see John Munro, 'Industrial Transformations in the North-West European Textile Trades, c. 1290 - c. 1340: Economic Progress or Economic Crisis?' in *Before the Black Death: Studies in the 'Crisis' of the Early Fourteenth Century*, ed. Bruce M. S. Campbell (Manchester and New York: Manchester University Press, 1991), pp. 110 - 48; and also the Introduction to this volume by Barbara Harvey.

[46] John Najemy, *A History of Florence, 1200 - 1575* (Oxford: Blackwell Publishing, 2006), pp. 96-100; Richard Goldthwaite, *The Economy of Renaissance Florence* (Baltimore: The Johns Hopkins University Press, 2009), pp. 267-82.

[47] Zvi Razi, *Life, Marriage and Death in a Medieval Parish: Economy, Society, and Demography in Halesowen, 1270-1400* (1980): chapter 2, 'The Population of Halesowen 1270-1348', pp. 27-98; Bruce Campbell, 'Population Pressure, Inheritance, and the Land Market in a Fourteenth-Century Peasant Community', in Richard Smith, ed., *Land, Kinship and Life-Cycle* (Cambridge, 1984), pp. 87 - 134; Barbara Harvey, 'The Population Trend in England Between 1300 and 1348', *Transactions of the Royal Historical Society*, 5th ser. 16 (1966), 23-42; Richard M. Smith, 'Demographic Developments in Rural England, 1300-48: a Survey', in B.M. Campbell, ed., *Before the Black Death: Studies in 'Crisis' of the Early Fourteenth Century* (Manchester, 1991), pp. 25 - 78.

[48] See, for example, in a recent study: Richard M. Smith , 'Plagues and People: The Long Demographic Cycle, 1250 - 1670', in Paul Slack and R. Ward, eds., *The Peopling of Britain: The Shaping of a Human Landscape* (Oxford: Oxford University Press, 2002). See n. 1 above.

(2) Two recent studies (1993, 1996), however, argue the case for a much lower maximum population: one around 4.0 to 4.5 million.[49]

(3) After several late-medieval demographic catastrophes, and most especially following the Black Death, population declined dramatically, reaching a low point of about 2.25 million in the later 15th or early 16th century (around 1525).

(4) Thereafter England's population, along with the general European population, rapidly recovered, over the next century, to reach a new peak of 5.6 million in the early 1650s.

(5) Now if the medieval maximum, around 1300, had been as much as 6.5 or 7.0 million, we would more likely believe the following:

- that late-medieval England would have experienced a Malthusian crisis
- especially if there is evidence for at least an incipient Malthusian crisis after the 1620s
- for if England, then having a population of only 5.6 million, with a far more advanced economy and technology, had such difficulties by the 1640s, how much less able had England been to cope with such economic and demographic pressures around 1300

(6) But if that medieval peak had only been 4.0 to 4.5 million, as just noted:

- it should have been much better able to cope with a growing population
- while conversely an English population of 5.6 million in 1650 might indeed have produced problems of diminishing returns, especially in the agricultural sector.

(7) In any event, the statistical evidence for a Malthusian crisis around 1300 is very thin, as will be shown, below.

(8) That did not prevent Michael Postan, from making the following, very sweeping observation that best expresses the Malthusian -- or rather the Ricardian-Malthusian view.

(9) He illustrates his verdict by citing a more recent and well documented phenomenon: the Irish potato famine of the 1840s, and thus he states:

> In Ireland the potato, which had borne well on newly reclaimed land, suddenly gave out in the late forties mainly through plant disease; and [the] population, which had previously added to its potato crops as it married and bred, suddenly found itself faced with famine. It will not be too fanciful to project a somewhat similar story into the facts of the Middle Ages and to see in the falling production of the later centuries a natural punishment for earlier overexpansion. As long as the colonization movement went forward and new lands were taken up, the crops from virgin lands encouraged men to establish new families and settlements. But after a time the marginal character of marginal lands was bound to assert

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[49] See n. 1 above, in particular Bruce M.S. Campbell, James A. Galloway, Derek Keene, and Margaret Murphy, *A Medieval Capital and Its Grain Supply: Agrarian Production and Distribution in the London Region c. 1300*, Institute of British Geographers, Historical Geography Research Series no. 30 (London, 1993); Pamela Nightingale, 'The Growth of London in the Medieval English Economy', in Richard Britnell and John Hatcher, eds., *Progress and Problems in Medieval England* (Cambridge and New York, 1996), pp. 89-106.

> itself, and the honeymoon of high yields was succeeded by long periods of reckoning, when the poorer lands, no longer new, punished the men who tilled them with failing crops and with murrain [disease] of sheep and cattle. In these conditions a fortuitous combination of adverse events, such as the succession of bad seasons in the second decade of the fourteenth century, was sufficient to reverse the entire trend of agricultural production and to send the population figures tumbling down.[50]

iv) **The English statistical evidence, however, does not really support this view:**[51]

According to the Phelps Brown and Hopkins 'basket of consumables' real wage index (mean of 1451-75 = 100), the decennial mean indices of real-wages for the following periods before the Great Famine were in fact rising, as is indicated on the graph, and in Table 5 (Appendix).

v) **The Great European Famine of 1315-1317 (or to 1322)**:

(1) This is the event to which Postan is referring; and in some places, that famine inflicted mortalities of 10% or even up to 15%.

(2) Earlier I referred to demographic evidence for the English county of Essex: evidence that shows a fairly sharp and continuous decline indeed from the very time of this Famine.

(3) The Great Famine was not directly caused by any Malthusian Crisis, but by accidents of nature:

- a combination of excessively dry weather in the Mediterranean, ruining grain harvests,
- and conversely of excessively wet and cold Spring-Summer seasons in the north, which similarly ruined grain harvests, sending grain prices soaring to unprecedented levels.

(4) Nevertheless, if this was fortuitous, an accident of nature, one might still argue that both higher mortalities and fertility reductions were aggravated by general malnourishment and long years of high living costs.

(5) Nature never again -- in the period and area covered by this course -- inflicted such a famine on European society;

(6) But late-medieval warfare certainly did bring about many local famines.

c) **Plague and the Late-Medieval Demographic Crisis**:

i) **By and from the mid-14th century, Europe was indisputably undergoing the most severe demographic crisis that it had ever endured:**

(1) These demographic crises lasted until the very end of the 15th century or early 16th century.

(2) During this period, Europe lost well more than a third of its population, perhaps even half

(3) by any definition, that is surely a great catastrophe.

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[50] Michael Postan, 'The Economic Foundations of Medieval Society', *Jahrbücher für Nationalökonomie*, 161 (1951).

[51] Henry Phelps Brown and Sheila V. Hopkins, 'Seven Centuries of the Prices of Consumables Compared with Builders' Wage-Rates', *Economica*, 23, no. 92 (November 1956), reprinted in their *A Perspective of Wages and Prices* (London, 1981), 13-59 (with additional statistical appendices not in the original).

ii) **The Black Death**: in 1347-48, was probably the most important single cause of this disaster, even if demographic decline had begun before the plagues.

(1) I explained last day the current debate about the nature of this disease: whether or not it was bubonic plague;

(2) It certainly differed in many important respects from modern forms of bubonic plague, especially in having:

- far higher mortalities than are true today, or in the Third Pandemic of 1897-1947.
- far more rapid and far more widespread diffusion of the plague

(3) While no one now can say with any certainly what the medieval disease actually was, several recent historians now speculate that,

- over the centuries the bubonic plague bacillus, *Yersinia pestis*, has mutated to produce an entirely different and far less virulent form of the plague disease.
- most diseases do in fact undergo mutation, and most mutations do produce less virulent forms of the earlier disease

(4) But if the 14th century Black Death was so much more virulent, the basic question remains:

- how was the medieval disease transmitted so rapidly and to so many people,
- a transmission which does not seem possible with the standard theory of infection from rat-fleas.

(5) Possibly the 1348 Black Death was a variant of pneumonic plague: but in modern times that is found to be only a secondary and minor variant of bubonic plague: i.e, it must first begin with bubonic plague, before being transformed into pneumonic (or septicaemic) plague.

iii) **A brief history of the later medieval plagues:**

(1) Certainly the first visitation (1347-52) was the worst, killing over a third of the population (more in the cities) – perhaps indeed as much as 40%;

(2) then it returned with a vengeance in the 1360s, this time killing chiefly the very young and the very old, indicating that healthy adults had acquired some degree of immunity.

(3) In any event, the mortality from bubonic plague, as I noted last day, was about 60% - 80%, while mortalities from pneumonic plague were well over 99%.

(4) To give you some idea of the magnitude of that catastrophe, let me note that by the late 1370s, England's population had fallen to just 2.25 million; and it would fall even further and not rise above that level until the 1520s.

(5) Whether you believe that England's population in 1300 had been 4, 5, 6, or 7 million, that drop is a horrifying catastrophe that evidently reduced the population by more than a half (and possibly by two-thirds).

(6) There were at least four more major visitations of plague over the 14th and 15th centuries, though it was always there, killing somebody.

(7) In the very famous English poem known as *Piers Plowman*, the author, William Langland (1362-63), compares the plague to a steady drizzle of rain through a leaking roof.

(8) Each subsequent visitation, however, seems to have become weaker than the last, more localized in scope, becoming chiefly an urban phenomenon, i.e., sparing the countryside, where most people still resided.

iv) **Other diseases also contributed to demographic decline**: especially dysentery, typhus, pneumonia, leprosy (and others inadequately documented).

v) **Warfare**:

(1) First and foremost, it is vital to stress that that late-medieval Europe experienced one of the worst, most widespread, and prolonged periods of warfare

- since the anarchy of the early Middle Ages, after the decline of the Roman Empire in the West
- and then with the subsequent invasions of Magyars (Hungarians), Muslims, and Vikings, in a three-pronged attack on Europe in the 8th and 9th centuries.

(2) For late medieval Europe, that spreading stain of warfare had begun as early as the 1290s, i.e., just before the onset of evident crisis, spreading throughout the entire Mediterranean basin, and especially afflicting Spain, southern France, Italy, and south Germany

(3) That warfare then merged into the more famous Hundred Years' War (1337-1453),

- principally between England and France, but involving most of western Europe,
- while warfare continued to afflict and ravage all of Italy, quite independently of the Anglo-French wars,
- except for the fact that unpaid English, French, Catalan, and German soldiers found employment in Italian mercenary armies,
- who had thus a vested interest in protracting, prolonging that Italian warfare.

(4) Much of Europe also experienced violent anarchy in this era: not only Italy, but large parts of Germany and France were also periodically ravaged by companies or gangs of unemployed soldiers, living off countryside.

(5) **Taxation:** often exorbitant increases in taxes were also a major cost of late-medieval warfare

- much of the taxation was on both trade and consumption: excise taxes
- the taxes were levied not so much as to pay for warfare directly, but instead to pay for the costs of public borrowing: i.e., interest payments, payments on annuities, redemptions

(5) **Demographic consequences of warfare:** to summarize the previous discussion

- as noted last day, deaths in battle were relatively minor, because armies were so small
- more significant were deaths from wounds and diseases that soldiers (and civilians) contracted during warfare
- and the impact of warfare in disrupting food production and distribution (trade), producing malnutrition, which thus lowered resistance to diseases
- and as also noted: diseases from the putrefaction of dead bodies, carried by rivers and streams, and thus by the domestic water-distributions systems.
- Samuel Cohn, in his attack on the traditional views about the Black Death as bubonic plague, has challenged us to pay more attention to how warfare spread diseases: through such pollution and contagion.

d) **The demographic and economic decline continued for over a century**:

Why the decline continued so long remains partly a mystery:

i) **For, obviously, had there been any Malthusian pressures,** they clearly would been reduced or eliminated by the first waves of plagues;

ii) **and secondly, as noted,** each following visitation of plague seems to have been less virulent, weaker, more localized;

iii) **Just the same, population continued to fall throughout the later 14th and 15th centuries,** though not necessarily at the same drastic rate.

iv) **Perhaps the answer lies in that debilitating combination of war, famine, malnutrition,** plague and other many diseases, besides plague; thus not one but a combination of factors.

v) **a reduction in the birth rate was obviously also involved in the continuing fall in population:** for the combination of reasons mentioned last day that physically depressed fertility.

vi) **periodic economic depressions -- to be explored later -- along with the economic dislocations** brought about by warfare, anarchy, plagues, and depopulation itself may itself also be cited as an important factor.

(1) Thus, a combination of hard times and pessimism may have led to postponed marriages -- a later than normal average age of marriage combined with permanent celibacy (i.e., people never marrying at all), which in turn would have seriously reduced the birth rate.

(2) Whether these circumstances therefore led to the emergence of the European Marriage Pattern, we cannot say -- that remains pure speculation.

e) **Demographic Recovery: can be detected during the mid to late 15th century in some regions of continental Europe)**: evidently first in Italy, but much later in NW Europe; in England and the Low Countries, demographic recovery evidently commenced only in the early 16th century.

i) **First and foremost, to explain demographic recovery,** was the final end of the Hundred Years War (1453), and general diminution in such large-scale prolonged warfare.

(1) Warfare of course continued to afflict Europe, but it was much more controlled and localized, more state directed, with no breakdown of central authority, no real anarchy as had been case earlier.

(2) From 1450s, large areas of western Europe were restored to settlement and cultivation.

ii) **Also a marked diminution in attacks of the plague**: either because of diminished warfare or because of some biological changes in the plague bacillus itself (if not the rats)

iii) **Economic Recovery:** More security, restored cultivation and restored trade routes (recovery especially of overland continental routes) together promoted a economic recovery, which in turn may well have promoted a strong demographic recovery.

iv) **Possibly as well, the undisputed rise in real wages during or by the 15th century.**

v) **But we shall leave these forces and the nature of the demographic recovery until the beginning of the second term,** in January, when we do our second survey of demographic movements, from about 1500 to 1750, to the eve of the Industrial Revolution.

f) **The Changing Distribution of European Population in the Late Middle Ages:**

Along with, or despite, the overall losses in European population during the late Middle Ages, that population underwent two very important shifts:

i) **greater urbanization:** which meant (as Jan de Vries has noted) that during the demographic catastrophes

cities were better able to regain their populations than were the surrounding countryside: consider the following table, which tells only part of the story:

(1) Around 1300, Europe's largest cities were evidently all in the Mediterranean:

- the largest was Constantinople at over 200,000; perhaps 300,000;
- then Venice and Milan at 150,000.
- For northern Europe, the conventional wisdom has been that no city was larger than 50,000
- but recently, one historian has contended that Paris had reached 300,000 by 1300;
- and London had achieved a population of 100,000 --- though historians in general have yet to be convinced of these figures; and Pamela Nightingale (n. 1 and 12 above) argues that London's maximum population was only 60,000 (or 80,000 at the very most).

Number of Cities in Indicated Population Range

Year	**range: 50,000-**	**range: 100,000 -**	**range:**
	100000	**400,000**	**over 400,000**
1300	4	3	0
1500	5	5	0

(2) By 1500, despite late-medieval depopulations, the number of large cities, over 100,000, had grown to 5 cities: with Paris and Naples; but London was still only about 60,000.

(3) How did this urban recovery and growth occur? Not by natural increases -- because death rates were and remained much higher in the towns (and birth rates may have been lower).

(4) Therefore the only possible source of such urban demographic growth was by immigration, chiefly from the surrounding countryside: i.e., by drawing off excess labour from the rural areas, from the agrarian sector.

ii) **A Population Shift from the Mediterranean to North-West Europe:**

(1) This is one of the major themes of this course: from ca. 1250 to ca. 1750

(2) But the following table indicates, however, for the medieval period (from 1000 to 1450),

- that this shift had occurred between 1000 and ca. 1320 – i.e., during the period of rapid population growth, and thus before the Black Death:
- when the share for West Central Europe rose from just 31% to 48%, i.e. almost one half

(3) But during the later Middle Ages, from the early fourteenth to the mid-fifteenth century,

- the Mediterranean basin had recovered some of its former share of Europe's population: increasing that share from 34% in 1310 to 38% in 1450
- Conversely, the share for West Central Europe fell from 48% to 44%

(4) the slight shift in percentages, during the later Middle Ages may suggest some:

- degree of an earlier demographic recovery in the Mediterranean zone, especially in Italy;
- but that may also be simply statistical error.

European Population Distributions, 1000 - 1450 CE

Area	1000 CE.	1310 CE	1450 CE
Mediterranean: Greece, Balkans, Italy, Iberia	17.0 (44%)	25.0 (34%)	19.0 (38%)
West-Central: Low Countries, France, Germany, Scandinavia, British Isles	12.0 (31%)	35.5 (48%)	22.5 (44%)
Eastern Europe: Russia, Poland-Lithuania, Hungary, Bohemia	9.5 (25%)	13.0 (18%)	9.5 (19%)
TOTAL:	**38.5**	**73.5**	**51**

Source: J.C. Russell, 'Population in Europe, 500 - 1500', in Carlo Cipolla, ed., *Fontana Economic History of Europe*, Vol. I: *The Middle Ages (900-1500)*, Table 1, p. 19.

10. **<u>The Economic Consequences of Population Decline in later medieval Europe (to 1520):</u>**

a) **There is no simple answer to explain the economic consequences of population decline;** and we shall subsequently, during the remainder of this term, examine them sector by sector (i.e., the four main sectors of the economy), and region by region.

b) **But I note here an historical paradox to summarize the views of many economic historians:**

i) **The negative:** many economic historians argue that

- depopulation, or perhaps more directly the terrible forces that brought about depopulation, produced an even worse economic contraction and dislocation.
- and then a series of economic downswings to culminate in what they call 'The Great Depression of the late Middle Ages',
- which will be a major subject to explore in coming lectures (as you can seen by the lecture schedule).

ii) **The positive:** many historians, including even some of the above, also argue that the decline in population brought about rising living standards for the lower economic strata of society, in the three following respects

of the model that they commonly put forward (their model, not mine):

c) **Rising Living Standards in later medieval Europe:**

i) **That the Black Death, by so radically changing the land:labour ratio, ushered in a Golden Age of the Labourer (or hired workers, agricultural and urban)**.[52]

ii) view first propounded by **James E. Thorold Rogers,** and maintained by a majority of economic historians to this very day is this specific thesis:

iv) **The demographic model for the thesis of rising living standards: in the land to labour ratio**

(1) **For the peasantry, or for the lower strata:**

- depopulation meant for this first time cheap and abundant land: that poorer peasants finally got a holding of their own,
- or could increase their holdings, gain more land, to support a family adequately;
- and that they paid much lower rents even for much larger land holdings

(2) **Labourers, artisans, other wage earners enjoyed a significant rise in real wages,**

- because of the alteration in the land:labour ratio,
- which must have increased the marginal productivity of labour,
- by the reverse process of that famous law of diminishing returns,
- which as I said before implies as well a law of increasing returns (i.e., increasing returns by reducing the amount of labour on land).

(3) They also enjoyed a rise in real wages because the cost of producing foodstuffs and the overall cost of living presumably went down.

v) **Consider this by reversing the standard Ricardian economics of population growth:** what therefore should we expect with population decline, in summary, with this model:

(1) **FALLING GRAIN PRICES:**

- which would hurt those landlords operating commercial farms,
- but also hurt those peasants similarly producing grain surpluses for the markets.

(2) **FALLING ECONOMIC RENTS:**

- which would certainly hurt landlords,
- but that would also harm those peasants who had earlier managed to hold or to secure some portion of those economic rents produced by prior population growth

(3) **RISING REAL WAGES:** as a result of both:

(a) much more favourable land:labour ratio

- that should have increased the marginal productivity of labour (at least in agriculture, if not

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[52] James E. Thorold Rogers, *A History of Agriculture and Prices in England*, Vol. I: *1259 - 1400* (Oxford: Clarendon Press, 1866). See also Michael Postan, *The Medieval Economy and Society: An Economic History of Britain in the Middle Ages* (1972); Michael Postan, 'Medieval Agrarian Society in Its Prime: England', in *Cambridge Economic History*, Vol. I: *Agrarian Life in the Middle Ages,* 2nd rev. edn. (Cambridge, 1966), section V: 'The Villagers', pp. 600-32; Michael Postan, *Essays on Medieval Agriculture and General Problems of the Medieval Economy* (Cambridge, 1973).

so obviously in industry)

- note: in Classical Theory, the Wage Rate = MRP_L, i.e. , the Marginal Revenue Product of Labour

(b) falling food prices and land/housing rents:

- a fall in the cost of living, with falling food prices
- note: the real wage is calculated as: RW = NWI/CPI
  i.e. , the Nominal Wage Index (money wages in silver) divided by the Consumer Price Index (the money cost of a basket of consumables and services)

v) **Now consider the graphs on the screen:** at least for grain prices and real wages, in 14th century England and 14th century Flanders. [53]

(1) Do they provide support for this Ricardian model, and for the thesis of rising real wages following the Black Death?

(2) Grain prices rose, not fell, in the aftermath of the Black Death and remained high until the late 1370s.

(3) Rents, of course, can not be seen on this graph: but let me note now, as I will certainly stress again under agriculture:

- that landlord rents in much of England continued to remain high and oppressive (certainly in the view of many peasants) for at least thirty years after the Black Death;
- according to George Holmes, *The Estates of the Higher Nobility in Fourteenth-Century England* (Cambridge, 1957), pp. 85-120, post-Plague English landlords may have increased their share of the national income by as much as 10%
- rents began to fall only from the very late 1370s or early 1380s.
- This topic will be considered in a subsequent lecture on Agriculture.

(4) Wages: in England, as you can see,

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[53] See my recent publications on this and related topics: 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; John Munro, 'Builders' Wages in Southern England and the Southern Low Countries, 1346 - 1500: A Comparative Study of Trends in and Levels of Real Incomes', in Simonetta Cavaciochi, ed., *L'Edilizia prima della rivoluzione industriale, secc. XIII-XVIII*, Atti delle "Settimana di Studi" e altri convegni, no. 36, Istituto Internazionale di Storia Economica "Francesco Datini" (Florence, 2004), pp. 1013-76; John Munro, 'The Usury Doctrine and Urban Public Finances in Late-Medieval Flanders (1220 - 1550): Rentes (Annuities), Excise Taxes, and Income Transfers from the Poor to the Rich', in Simonetta Cavaciocchi, ed., *La fiscalità nell'economia Europea, secc. XIII - XVIII/ Fiscal Systems in the European Economy from the 13th to the 18th Centuries*, Atti della 'Trentanovesima Settimana di Studi', 22 - 26 aprile 2007, Fondazione Istituto Internazionale di Storia Economica "F. Datini", Prato, Serie II: Atti delle "Settimane de Studi" et altri Convegni 39 (Florence: Firenze University Press, 2008), pp. 973-1026; John Munro, 'Before and After the Black Death: Money, Prices, and Wages in Fourteenth-Century England', in Troels Dahlerup and Per Ingesman, eds., *New Approaches to the History of Late Medieval and Early Modern Europe: Selected Proceedings of Two International Conferences at The Royal Danish Academy of Sciences and Letters in Copenhagen in 1997 and 1999*, Historisk-filosofiske Meddelelser, no. 104 (Copenhagen: The Royal Danish Academy of Sciences and Letters, 2009), pp. 335-364. These publications are all available in PDF format, on the Department of Economics publications website (for John Munro): click on 'freely available'
http://www.economics.utoronto.ca/index.php/index/research/publications?personId=51

- nominal money wages did shoot up right after the Black Death;
- but then consumer prices rose even more strongly, so that real wages actually decline once more,
- and certainly did not reach their earlier fourteenth century peak until much later in the century;

(5) Real wages in England would begin to enjoy a sustained long-term rise only from the late 1370s, early 1380s, just when rents were falling.

(6) Certainly by the 15th century they did rid rise markedly.

(7) For 14th and 15th- century Flanders, and for 15th-century Brabant (the duchy to the east of Flanders in the Low Countries, for which we have no 14th century data) you can see roughly the same phenomena on the screen.

(8) For Tuscany (Italy), in the four decades following the Black Death, David Herlihy has provided us with similar evidence for high prices for foodstuffs and basic necessities, falling or low real wages, and some considerable degree of economic misery.[54]

(9) What these graphs tell us is that we have to examine the nature of prices -- and in particular the relationship between money and prices -- before we can come to firm ideas about the course of real wages: i.e., what the artisan can purchase with his daily money wage.

(10) In essence, you can see that nominal money wages remain fixed over very long periods of time, so that the chief determinant of changes in real wages is in effect changes in the level of prices: i.e., inflation and deflation.

(11) So ultimately real wages did rise, and rose markedly; but not until the very late 14th or early 15th centuries: in both England and Flanders

(12) then they rise because of the onset of prolonged deflation, while wages remain sticky. Furthermore, real wages experienced some declines in 15th-century England and much especially in the Low Countries: in both the country of Flanders and the duchy of Brabant.[55] [See the graphs]

vi) **The message from these graphs, for England and the southern Low Countries:**

(1) The Golden Age of the Labourer, in the later Middle Ages, is largely a myth, though partially true for 15th-century England, if not Flanders and Brabant

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[54] David Herlihy, *Medieval and Renaissance Pistoia, 1200 - 1430* (1967), p. 145: 'By most measures, the period between approximately 1340 and 1400 must be considered an age of deep depression. These years were depressed as medieval men would have best understood the term: they were years of scarcity. High food prices, frequent famines, repeated protests in the sources concerning shortages of grain and meat within the city present a uniformly somber picture of disrupted production and continuing want. The bad times were bred by the shock of drastic population decline and by destructive wars and social unrest in the countryside'. He also notes that 'landlords and rentiers watched their rent levels since by 40 percent, and many were fortunate to find any tenant at all for their lands'. This post-Plague agrarian situation in Italy will be revisited in a subsequent lecture. See also pp. 78-120, 121-47.

[55] See: John H. 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 (2002), 185-297.

(2) That the behaviour of prices and wages is not solely dependent on demographic factors, but also on monetary factors:

(3) in that, from the later 14th century, the behaviour of real wages, at least in times of relative peace and economic stability, is conditioned by a combination of:

- institutional wage stickiness, so that nominal money wages rarely change
- fluctuations in the price level (Consumer Price Index): in that
- RWI = NWI/CPI
- so obviously if money wage are fixed or constant (in NWI), then changes in real wages (RWI) has to be a function of changes in the general level of prices: CPI

(4) **The Costs of Warfare:** as indicated, were often an equally or even more negative factor that negated other economic forces that should have led to rising incomes:

- for, as the next topic on MONEY, will demonstrate, one of the most common medieval techniques of financing warfare was coinage debasements: which were invariably highly inflationary, so that consumer prices rose more than wages
- the other method of financing warfare was public borrowing: which required often excessive, exorbitant increases in taxes, chiefly in the form of very regressive excise or consumption taxes on basic foodstuffs
- see the final graph: for the Flemish town of Aalst – demonstrating the negative consequences of both inflationary coinage debasements and taxes on real incomes

(5) That explains why we must now turn to the next segment of this macro-economic study: money, monetary factors, and prices.

APPENDIX A: The Economic Theories of Johann von Thünen
[from Answers.com and Wikipedia]

Johann Heinrich von Thünen (24 June 1783 - 22 September 1850) 'ranks alongside Marx as the greatest economist of the nineteenth century.' (Fernand Braudel).

- Von Thünen was a Mecklenburg (North German) landowner, who in the first volume of his treatise, *The Isolated State* (1826), developed the first serious treatment of spatial economics, connecting it with the theory of rent. The importance lies less in the pattern of land use predicted than in its analytical approach.
- Von Thünen developed the basics of the theory of marginal productivity in a mathematically rigorous way, summarizing it in the formula:
- $R = Y(p - c) - YFm$, where R=land rent; Y=yield per unit of land; c=production expenses per unit of commodity; p=market price per unit of commodity; F=freight rate; m=distance to market.

The Von Thünen model of agricultural land, created before industrialization, made the following simplifying assumptions:

- The city is located centrally within an 'Isolated State'.
- The Isolated State is surrounded by wilderness.
- The land is completely flat and has no rivers or mountains.
- Soil quality and climate are consistent.
- Farmers in the Isolated State transport their own goods to market via oxcart, across land, directly to the central city. There are no roads.
- Farmers behave rationally to maximize profits.

The use a piece of land is put to is a function of the cost of transport to market and the land rent a farmer can afford to pay (determined by yield, which is held constant here).

The model generated four concentric rings of agricultural activity. Dairying and intensive farming lies closest to the city. Since vegetables, fruit, milk and other dairy products must get to market quickly, they would be produced close to the city. Timber and firewood would be produced for fuel and building materials in the second ring. Wood was a very important fuel for heating and cooking and is very heavy and difficult to transport so it is located as close to the city.

The third zone consists of extensive fields crops such as grain. Since grains last longer than dairy products and are much lighter than fuel, reducing transport costs, they can be located further from the city.

Ranching is located in the final ring. Animals can be raised far from the city because they are self-transporting. Animals can walk to the central city for sale or for butchering. Beyond the fourth ring lies the wilderness, which is too great a distance from the central city for any type of agricultural product.

Von Thünen's rings proved especially useful to economic history, such as Fernand Braudel's *Civilization and Capitalism*, in untangling the economic history of Europe and European colonialism before the Industrial Revolution blurred the patterns on the ground.

In economics, von Thünen rent is an economic rent created by spatial variation or location of a resource. It is 'that which can be earned above that which can be earned at the margin of production'.

Model of agricultural land use: The Thünen rings

Thünen's model: the black dot represents a city; 1 (white) dairy and market gardening; 2 (green) forest for fuel; 3 (yellow) grains and field crops; 4 (red) ranching; the outer, dark green area represents wilderness where agriculture is not profitable

Thünen's model: the black dot represents a city; 1 (white) dairy and market gardening; 2 (green) forest for fuel; 3 (yellow) grains and field crops; 4 (red) ranching; the outer, dark green area represents wilderness where agriculture is not profitable

In his theory of "The Isolated State", he started out from Adam Smith's idea of "economic man": that the farmer is expected to maximize his profit ("economic rent") from his farmland. Von Thünen, as a landlord, knew that such returns depends on an optimal use of the land surfaces and the transport costs. In concentrating on the effects of these two variables on profits, removal of other factors results in a homogeneous - and isolated - state: A circular, completely undilating plane with a single, dominant market in the center and no interactions with the outside. The economy in the surrounding rural area would have to rearrange itself according to economic behavior in such a way that each industry brings optimal profit in:

Transport cost depends on the distance from the market and different kind of products. The gain from farming per unit area (locational rent) decreases with increasing distance from the market. The minimum price of a commodity is calculated by locational rent, transport costs and fixed production costs - the profit is then the difference between the costs and the fixed market price. Idealized pattern of agricultural land use zones in von Thünen's model

Locational rent, a term used by von Thünen in his argument, is to be understood as the equivalent to land value. It corresponds to the maximum amount a farmer could pay for using the land, without making losses. It can be defined as the equation below:

$L = Y(P - C) - YDF$ is...

* L: Locational rent (in DM/km2)
* Y: Yield (in t / km2)
* P: Market price of the crop (in DM / t)
* C: Production cost of the crop (in DM / t)
* D: Distance from the market (in km)
* F: Transport cost (in DM / t / km)

Take the locational rent of a product with a yield of 1,000 t / km2, for example, with a fixed price of 100 DM/t in the market. Production and transport costs are respectively, 50 DM/t and 1 DM/t/km. The locational rent is 50,000 DM/km^(2) at the market, 40,000 DM/km^(2) 10 km from the market and only 20,000 DM/km^(2) 30 km from the market. Since locational rent falls with increasing distance from the market, the amount each farmer is willing to pay for agricultural land will shrink and the price of land will eventually decline.

Von Thünen concluded that the cultivation of a crop is only worthwhile within certain distances from the city: beyond that, either the cost of the land becomes too high, with increasing distances transport costs also increase, or, if there is another product having greater yield or lower transport costs. After a distance from the market (the city) the production of a crop becomes unprofitable, either because its profits drop to zero or the profits earned by other crops are higher, as von Thünen calculated them for products having different intensities (cattle, wood, grain, eggs, milk, etc.): For each product there is a certain distance from the city where its production would be worthwhile. Since Thünen referred transport costs directly to the market ("Luftlinie"), circular land use zones arises - the Thünen rings.

Representation of the locational rent relationship between two agricultural goods

The farmers of these products compete against each other, plant their crops concentrically around the market according to the locational rent curves of their own crops. Products having low yields with high price and high transport costs relative to its weight or distance due to its weight, will have higher locational rent close to the market than a product having lower transport costs. Locational rent is the highest possible amount one will pay for the use of the land for a certain cultivation, and is a relative indicator of competitiveness of it in the market. [work on]

Weaknesses & Criticism

The model was developed in an isolated state and did not take into consideration differences in sites (local physical conditions). It can be modified by relaxing some of the conditions set forth by Von Thunen:

- differential transportation costs. example boats are the cheapest mode of transportation.
- variations in topography
- soil fertility
- changes in demand or price of the commodity
- government policies

However, the model tends to hold true in most instances. The theory may break down somewhat in industrial and post-industrial economies as urban expansion/sprawl occur. For example, modern refrigerators also enable perishable products to be transported longer distances

Like many other models in geography, von Thünen's model was criticized frequently due to its restrictive nature. The basic conditions of the model, however, could be approximated by slight modifications of the

respective reality. The circular pattern, which can be attributed to only one market and excluding transport costs gradients running from the centre, is for example only one of many conceivable geometrical starting situations. If other natural landscapes or transportation routes are present, the land use zones would be stripe-formed. If several markets were present, groups of zones would be formed around each market.

A justified objection against it is the reference to the absence of any productive profit. In von Thünen's theory different agricultural uses compete for the optimal location, which results from the product-specific supply/expenditure relation. The competitive power becomes indirectly measurable over locational rent. After deducting production costs and location-specific transport costs, however, nothing more remains of the market profits. The von Thuenen model leads to the idea of complete self-sufficiency among farmers.

Thünen's idea of ‘economic rent’ attempted - while ignoring other characteristics - to explain the use of zones controlled solely by economically rational perception. Possible consumers play, finally, the crucial role for the choice of location. At the same time evaluation of all potential locations is released, which leads to a zoning of the possible offers. This simply developed space restaurant model reacts however sensitively to changes of the space overcoming costs. It possesses however due to its universality nevertheless a high value within geographical questions and methodology.

APPENDIX B: J. E. Thorold Rogers on the Black Death.

Bubonic plague is transmitted, at least in modern times, by the bacillus *Yersinia pestis* (sometimes also known as *Pasteurella pestis*). One major reason why this disease was so difficult for our ancestors to combat was that they did not know its causes, and indeed they knew nothing what so ever about the bacterial transmission of disease (let alone viral diseases). The first to make this discovery of the role of bacteria in causing diseases were:

(1) the German scientist and bacteriologist Robert Koch (1843-1910), who, in 1876, demonstrated that the bacterium *Bacillis anthracis* causes the animal disease anthrax, which can be transmitt4ed to humans. In 1882, he also discovered the tuberculosis bacillus, in 1883 and the cholera bacillus. In 1905, he won the Nobel Prize for Medicine & Physiology for these discoveries.

(2) the French scientist Louis Pasteur (1822-1895), a professor of chemistry at the Sorbonne, who established that micro-organisms caused both putrefaction and fermentation; who demonstrated that heating milk will kill its harmful micro-organisms (i.e., 'pasteurization'). In 1881 demonstrated that sheep 'vaccinated' with attenuated anthrax bacilli received protection against this disease.

As noted in the lectures, the plague bacillus *Yersinia pestis*, was discovered by the Swiss - born French bacteriologist Alexandre Yersin (1863-1943), who had been a student of Louis Pasteur. He was serving the British government as a bacteriologist In Hong Kong, in 1894, with the outbreak of the so-called Third Pandemic of this disease. Having studied at the Pasteur Institute in Paris, he founded two similar Institutes in China and developed a serum against the Plague. The First Pandemic, known as the 'Justinian Plague', took place during the 6th, 7th, and 8th centuries; [56] the Second, from 1347-1743 in Western Europe; until the 1870s in eastern Europe, Asia Minor, and Egypt); the Third, from 1894 to 1947.[57]

The lecture examines the current debate as to whether the first two Pandemics were in fact bubonic plague, in the form known from 1894.

For centuries prior to this discovery, Europeans believed in the *miasma* theory of disease: 'a vaporous exhalation formerly believed to cause disease; broadly, a heavy vaporous emanation or atmosphere.' (*Webster's New Collegiate Dictionary*). For an example of this viewpoint, expressed as late as the 1860s, by one of the world's then most eminent historians, see the following, while noting that the author provides no footnotes or documentary sources for his assertions:

James E. Thorold Rogers, *A History of Agriculture and Prices in England*, Vol. I: *1259 - 1400* (Oxford: Clarendon Press, 1866), pp. 292-94:

> The Black Death appears to have had its origins in the centre of China, in or about the year 1333. It is said that it was accompanied at its outbreak by various terrestrial and atmospheric phaenomena of a novel and most destructive character, phaenomena similar to those which

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[56] See Lester E. Little, ed., *Plague and the End of Antiquity: the Pandemic of 541 - 750* (Cambridge and New York: Cambridge University Press, 2007).

[57] Much of the standard literature contends that, in western Europe, the plague ended with the Marseilles plague of 1719-20. That is not true; for in 1743, over 48,000 died from plague in Messina (Sicily).

> characterized the first appearance of the Asiatic Cholera, of the Influenza, and in even more remote times of the Athenian Plague. It is a singular fact that all epidemics of an unusually destructive character have had their home in the farthest East, and have travelled slowly from those regions towards Europe....The disease still exists under the name of the Levant or Oriental Plague, and is endemic in Asia Minor, in parts of Turkey, and in Egypt. It is specifically a disease in which the blood is poisoned, in which the system seeks to relieve itself by suppuration of the glands, and in which, the tissues becoming disorganized, and the blood thereupon being infiltrated into them, dark blotches appear on the skin. Hence the earliest name by which the Plague was described [i.e., Black Death].
>
> The storm burst on the Island of Cyprus at the end of the year 1347, and was accompanied, we are told, by remarkable physical phaenomena, as convulsions of the earth, and a total change in the atmosphere. Many persons affected died instantly. The Black Death seemed, not only to the frightened imagination of the people, but even to the more sober observation of the few men of science of the time, to move forward with measured steps from the desolated East, under the form of a dark and fetid mist. It is very likely that consequent upon the great physical convulsions which had rent the earth and preceded the disease, foreign substances of a deleterious character had been projected into the atmosphere, had permanently infected its lower regions, and could not, by the ordinary powers of dispersion possessed by the air, be easily eliminated or neutralized. We are informed, as part of a physical theory which may account for the prevalence of bronchitis accompanied by severe depression of the vital powers, that such a state may be induced by accidentally inhaling very small quantities of the vapour of selenium, and if this substance, a product of volcanic action, were dispersed in the air, that there might be, probably is, a general affection of all who are subject to its influences. Hereafter, perhaps, chemical analysis, which has already succeeded in detecting the most minute particles of inorganic substances contained in compound bodies, may be able to discover these abnormal admixtures in the air.
>
> On the 25th of January 1348 an earthquake laid waste [a] great part of the peninsulas of Italy and Greece. Meanwhile, the disease was steadily progressing; its course being made known and probably accelerated by the caravan traffic.... The Black Death appeared at Avignon in January 1348, visited Florence by the middle of April, and had thoroughly penetrated France and Germany by August...
>
> The mortality was enormous. Perhaps from one-third to one-half of the population fell victims to the disease. Panic, however, is sure to exaggerate numbers. Adam of Monmouth says that only a tenth of the population survived. Similar amplifications are found in all the chroniclers.....

J.E. Thorold Rogers, who was Professor of Political Economy in Oxford University, was the first scholar to put forward and popularize the now common view that the Black Death, through such terrible depopulations over the next century, and thus through a drastic alteration in the land:labour ratio [presumably increasing the Marginal Product of Labour], ushered in a 150-year-long (i.e., to ca. 1500) 'Golden Age of the Labourer', whose standard of living would not again be equalled until Thorold Rogers' own day. Thus, on p. 265, he tells us that: 'The immediate effect of the Plague was to double the wages of labour; and in some districts,

to raise the rate even beyond this.’ [in nominal or real terms?? He does not say.]

Table 1: Demographic Data for Contemporary Countries in Europe, North and South America, and Eastern Asia-Pacific in 2013

Country	Population in millions	Birth Rate per 1000	Death Rate per 1000	Infant Mortality	Life Expectancy Total	Life Expectancy Males	Life Expectancy Females
Canada	35.30	11	7	4.90	81	79	83
U. S. A.	316.20	13	8	5.90	79	76	81
Argentina	41.30	19	8	11.70	76	72	80
Cuba	11.30	12	8	4.90	78	76	80
U.K.	64.10	13	9	4.20	82	80	84
Belgium	11.20	12	9	3.30	80	78	83
Netherlands	16.80	10	8	3.70	81	79	83
France	63.90	13	9	3.30	82	79	85
Germany	80.60	8	11	3.30	80	78	83
Switzerland	8.10	10	8	3.80	83	80	85
Norway	5.10	12	8	2.40	81	79	83
Sweden	9.60	12	10	2.60	82	80	84
Italy	59.80	9	10	3.20	82	79	85
Spain	46.60	10	8	3.10	82	79	85
Russia	143.5	13	13	7.40	70	64	76
Japan	127.3	8	10	2.20	83	79	86
China	1357.4	12	7?	16.00	75	73	77
Taiwan	23.4	10	7	4.20	79	76	83
Australia	23.1	13	6	3.40	82	80	84

Source: *2013 World Population Data Sheet* (Population Reference Bureau): http://www.prb.org/

Table 2: Estimates of European Population, 1300 - 1800

1000	40 million
1150	60 - 70
1300	80 - 100
1350	75 - 90
1400	52 - 60
1450	50
1500	61
1550	69
1600	78
1650	74
1700	84
1750	97
1800	122

Table 3. **The Effects of Changing Relative Areas of Grasslands (livestock-pasture) and Arable (grain crops) on the Output of a 100-acre Farm:**

in bushels per acre (with livestock output equivalents)

Model: 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 4. **Population Decline and Poverty in the Duchy of Brabant, 1437 - 1496**
Number of Family Hearths (Households) and Percentage of Total Hearths without Taxable Income ('Poor Hearths'): 1437, 1480, and 1496

Area of Census	1437: no. of hearths in census	1437: per-cent poor hearths	1480: no. of hearths in census	1480: per-cent poor hearths	1496: no. of hearths in census	1496: no. of poor hearths
Brussels	6,376	10.5	7,414	7.9	5,750	17.1
Antwerp	3,440	13.5	5,450	10.5	6,586	12.5
Leuven	3,579	7.6	3,933	18.3	3,069	n.a.
s'Hertogen-bosch	2,883	10.4	2,930	7.9	3,456	n.a.
Sub-total Large Towns	16,278	10.5	19,727	14.8	18,861	n.a.
Small Towns	14,159	9.2	12,216	28.1	10,600	n.a.
Villages	62,301	29.7	54,540	31.6	45,882	n.a.
Total Duchy	**92,738**	**23.4**	**86,483**	**27.3**	**75,343**	**n.a.**
Percentage Change from 1437			**6.74%**		**18.76%**	

Source: Joseph Cuvelier, *Les dénombrements de foyers en Brabant, XIVe- XVIe siècle*, 2 vols. (Brussels, 1912-13), Vol. I, pp. 432-3, 446-7, 462-77, 484-7; and also pp. cxxxv, clxxvii-viii, ccxxiii-xviii.

Table 5: European Population Distributions, 1000 - 1450 CE

Area	1000	1310	1450
Mediterranean: Greece, Balkans, Italy, Iberia (Spain and Portugal)	17.0 (44%)	25.0 (34%)	19.0 (38%)
West-Central: Low Countries, France, Germany, Scandinavia, British Isles	12 (31%)	35.5 (48%)	22.5 (45%)
Eastern Europe: Russia, Poland-Lithuania, Hungary, Bohemia	9.5 (25%)	13.0 (18%)	9.5 (19%)
TOTALS:	**38.5**	**73.5**	**51**

Source: J.C. Russell, 'Population in Europe, 500 - 1500', in Carlo Cipolla, ed., *Fontana Economic History of Europe*, Vol. I: *The Middle Ages (900-1500)*, Table 1, p. 19.

Table 6: Age Specific Marital Fertility Rates per 1,000 women-years lived and Total Marital Fertility Rates in England

Periods/Ages	1680-1729	1730-1779	1780-1829
15-19	315	430	532
20-24	410	418	429
25-29	366	364	390
30-34	315	314	312
35-39	240	254	255
40-44	111	134	148
45-49	22	22	23
TMF 20-49	7.32	7.53	7.79
TMF 15-49	8.9	9.68	10.45

Source: E. Anthony Wrigley, 'British Population during the "Long" Eighteenth Century, 1680 - 1840', in Roderick Floud and Paul Johnson, eds., *Cambridge Economic History of Modern Britain*, 3 vols. (Cambridge and New York: Cambridge University Press, 2004), Vol I: *Industrialization, 1700 - 1860*, Table 3.2, p. 70.

Table 7. **Nominal and Real Wages for Master Building Craftsmen in Small Towns of SE England:**

in pence sterling and in index numbers

in quinquennial means: 1266-70 to 1516-20
Mean of 1451 - 75 = 100

RWI = NWI/CPI

5 Year Means	Total Value of PBH Basket in d ster Arithmetic mean	PBH Prices Consumer Price Index Munro version 1451-75=100 Arithmetic mean	Master Nominal Day Wage in d. for a Arithmetic mean	Master Mason: Nominal Wage Index 1451-75=100 [= 6d. daily] Arithmetic mean	Master Mason: Real Wage Index (Munro) 1451-75=100 Harmonic mean	Index Numbers Master RWI No. of Baskets Consumed in one year 1451-75=100 Harmonic mean	Master RWI No. of Baskets Consumed in one year (210 days) Harmonic mean
1266-70	95.711	84.850	3.000	50.000	58.928	58.928	6.582
1271-75	119.267	105.733	3.000	50.000	47.289	47.289	5.282
1275-80	112.827	100.023	3.000	50.000	49.988	49.988	5.584
1281-85	118.648	105.184	3.000	50.000	47.536	47.536	5.310
1286-90	92.444	81.953	3.000	50.000	61.010	61.010	6.815
1291-95	118.863	105.375	3.000	50.000	47.450	47.450	5.300
1296-1300	113.122	100.285	3.000	50.000	49.858	49.858	5.569
1301-05	103.414	91.679	3.300	55.000	59.714	59.714	6.670
1306-10	117.006	103.728	3.600	60.000	57.971	57.971	6.475
1311-15	124.580	110.443	4.000	66.667	60.363	60.363	6.743
1316-20	174.344	154.560	4.000	66.667	43.133	43.133	4.818
1321-25	147.434	130.704	4.000	66.667	51.006	51.006	5.697
1326-30	118.116	104.712	4.000	66.667	63.666	63.666	7.112
1331-35	123.074	109.108	4.000	66.667	61.102	61.102	6.825
1336-40	100.682	89.256	3.600	60.000	66.986	66.986	7.482
1341-45	96.482	85.533	3.000	50.000	58.457	58.457	6.530
1346-50	112.873	100.064	3.000	50.000	49.968	49.968	5.582
1351-55	142.661	126.472	3.600	60.000	46.552	46.552	5.200
1356-60	133.209	118.092	4.600	76.667	64.611	64.611	7.217

5 Year Means	Total Value of PBH Basket in d ster Arithmetic mean	PBH Prices Consumer Price Index Munro version 1451-75=100 Arithmetic mean	Master Nominal Day Wage in d. for a Arithmetic mean	Master Mason: Nominal Wage Index 1451-75=100 [= 6d. daily] Arithmetic mean	Master Mason: Real Wage Index (Munro) 1451-75=100 Harmonic mean	Index Numbers Master RWI No. of Baskets Consumed in one year 1451-75=100 Harmonic mean	Master RWI No. of Baskets Consumed in one year (210 days) Harmonic mean
1361-65	155.637	137.976	5.000	83.333	60.397	60.397	6.746
1366-70	153.928	136.460	5.000	83.333	61.068	61.068	6.821
1371-75	143.646	127.345	5.000	83.333	65.439	65.439	7.310
1376-80	123.958	109.891	5.000	83.333	75.832	75.832	8.471
1381-85	127.679	113.190	5.000	83.333	73.622	73.622	8.224
1386-90	114.191	101.233	5.000	83.333	82.319	82.319	9.195
1391-95	117.259	103.953	5.000	83.333	80.165	80.165	8.955
1396-1400	124.812	110.648	5.000	83.333	75.314	75.314	8.413
1401-05	127.073	112.653	5.100	85.000	75.156	75.156	8.395
1406-10	123.998	109.927	5.800	96.667	88.115	88.115	9.843
1411-15	122.119	108.261	6.000	100.000	92.369	92.369	10.318
1416-20	128.139	113.598	6.000	100.000	88.030	88.030	9.833
1421-25	117.020	103.740	6.000	100.000	96.395	96.395	10.767
1426-30	127.025	112.610	6.000	100.000	88.802	88.802	9.919
1431-35	123.090	109.122	6.000	100.000	91.641	91.641	10.236
1436-40	140.118	124.218	6.000	100.000	80.504	80.504	8.992
1441-45	104.424	92.574	6.000	100.000	108.022	108.022	12.066
1446-50	114.200	101.241	6.000	100.000	98.774	98.774	11.033
1451-55	114.774	101.750	6.000	100.000	98.280	98.280	10.978
1456-60	110.500	97.961	6.000	100.000	102.082	102.082	11.403
1451-65	114.489	101.497	6.000	100.000	98.525	98.525	11.005
1466-70	115.869	102.720	6.000	100.000	97.352	97.352	10.874
1471-75	108.370	96.072	6.000	100.000	104.088	104.088	11.627
1476-80	104.529	92.667	6.000	100.000	107.913	107.913	12.054
1481-85	136.921	121.383	6.000	100.000	82.384	82.384	9.202
1486-90	114.232	101.269	6.000	100.000	98.747	98.747	11.030
1491-95	115.671	102.545	6.000	100.000	97.518	97.518	10.893
1496-1500	111.152	98.538	6.000	100.000	101.483	101.483	11.336
1501-05	120.005	106.386	6.000	100.000	93.997	93.997	10.500
1506-10	118.499	105.052	6.000	100.000	95.191	95.191	10.633
1511-15	119.584	106.014	6.000	100.000	94.327	94.327	10.537

5 Year Means	Total Value of PBH Basket in d ster Arithmetic mean	PBH Prices Consumer Price Index Munro version 1451-75=100 Arithmetic mean	Master Nominal Day Wage in d. for a Arithmetic mean	Master Mason: Nominal Wage Index 1451-75=100 [= 6d. daily] Arithmetic mean	Master Mason: Real Wage Index (Munro) 1451-75=100 Harmonic mean	Index Numbers Master RWI No. of Baskets Consumed in one year 1451-75=100 Harmonic mean	Master RWI No. of Baskets Consumed in one year (210 days) Harmonic mean
1516-20	139.678	123.827	6.000	100.000	80.758	80.758	9.021

Sources:

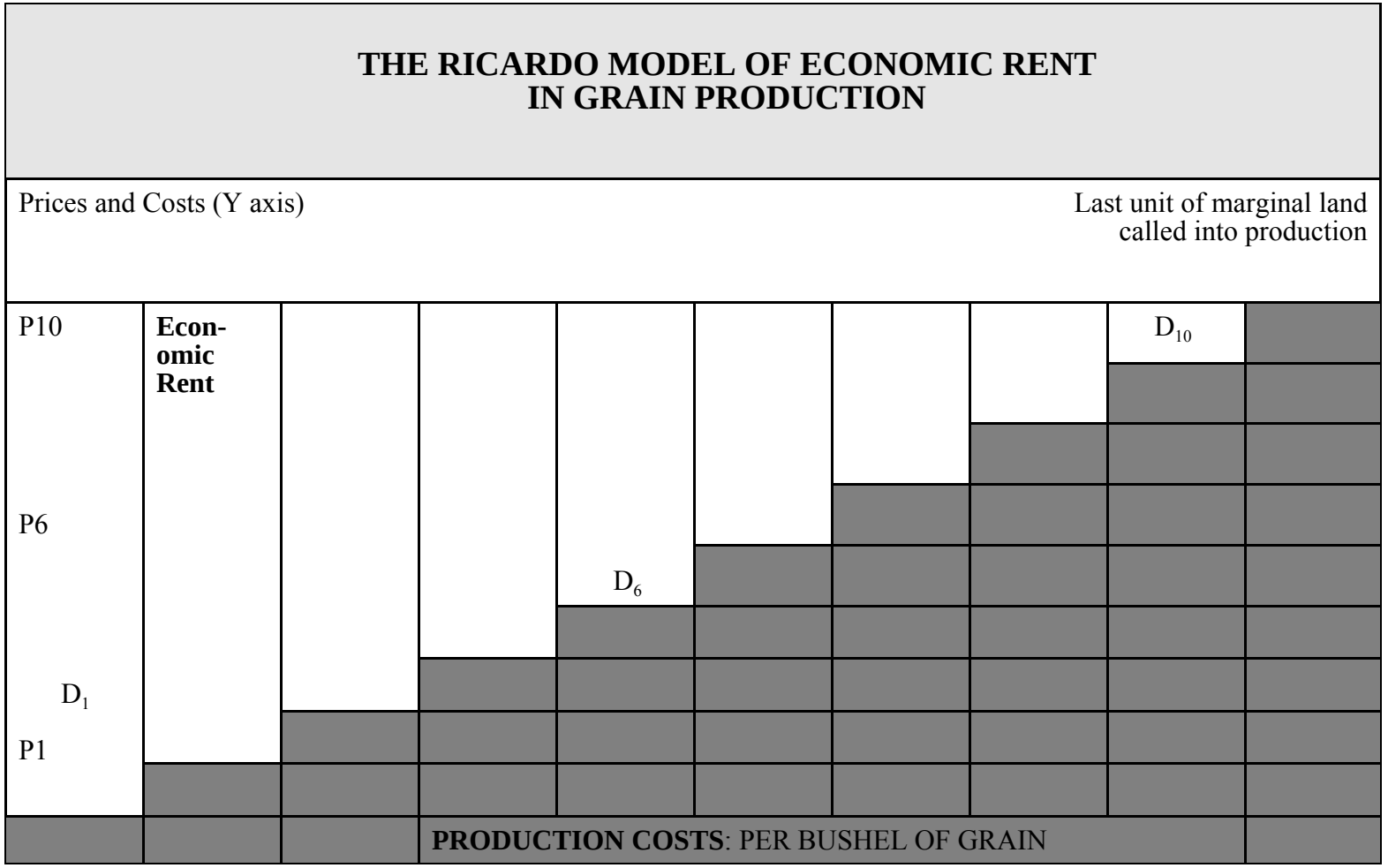
(1) **Prices:**

Archives of the British Library of Economic and Political Science (LSE), The Phelps Brown Papers, Folder no. 204.

(2) **Wages:**

Phelps Brown, E. Henry; and Sheila V. Hopkins, 'Seven Centuries of Building Wages', *Economica*, 22:87 (August 1955), 195-206, reprinted in Henry Phelps Brown and Sheila Hopkins, *A Perspective of Wages and Prices* (London: Methuen, 1981), pp. 1- 12.

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

DAVID RICARDO (1772 - 1823)

ECONOMICS OF POPULATION GROWTH

(1) RISING GRAIN PRICES:

- **population growth forces higher cost marginal lands into production, so that the market price of grain is determined by the marginal cost of producing the last unit of grain on that last unit of land called into production**
- **Law of Diminishing Returns: declining marginal productivity of labour, on existing lands in production**

(2) RISING ECONOMIC RENTS

- **higher grain prices determine the rent (rent does not determine prices)**
- **see Ricardo Economic Rent model**
- **in Ricardo's view, the landlord has the power to expropriate the entire rent**

(3) FALLING REAL WAGES

- **adverse change in the land:labour ratio, with diminishing returns, and falling marginal productivity of labour**
- **Note: In Classical Economic Theory, the Rea; Wage Rate = MRP_L; i.e. , the Marginal Revenue Product of Labour (the market value of the last unit of production produced by the last unit of labour added to a fixed stock of land and capital**
- **higher cost of living (with rising grain and other food prices)**
- **the real wage is the quantity of goods and services acquired with the money wage; and it is calculated as: RW = NWI/CPI**

  i.e., the Nominal Wage Index (of money wages paid in current silver coin) divided by the Consumer Price Index (the money value of a basket of consumables plus services).

DAVID RICARDO (1772 - 1823)

ECONOMICS OF POPULATION DECLINE

(1) FALLING GRAIN PRICES:

- **which would hurt those landlords operating commercial farms,**
- **but also hurt those peasants similarly producing grain surpluses for the markets.**

(2) FALLING ECONOMIC RENTS:

- **which would certainly hurt landlords,**
- **but also those peasants who had earlier managed to hold or to secure some portion of those economic rents produced by prior population growth**

(3) RISING REAL WAGES: as a result of both:

(a) much more favourable land:labour ratio

- **that should have increased the marginal productivity of labour (at least in agriculture, if not so obviously in industry)**
- **note: in Classical Theory, the Wage Rate = MRP_L, i.e. , the Marginal Revenue Product of Labour**

(b) falling food prices and land/housing rents:

- **a fall in the cost of living, with falling food prices**
- **note: the real wage is calculated as: RW = NWI/CPI**
  i.e. , the Nominal Wage Index (money wages in silver) divided by the Consumer Price Index (the money cost of a basket of consumables and services)