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The short history of development of pre-industrial England (14 – first half of 18 c).

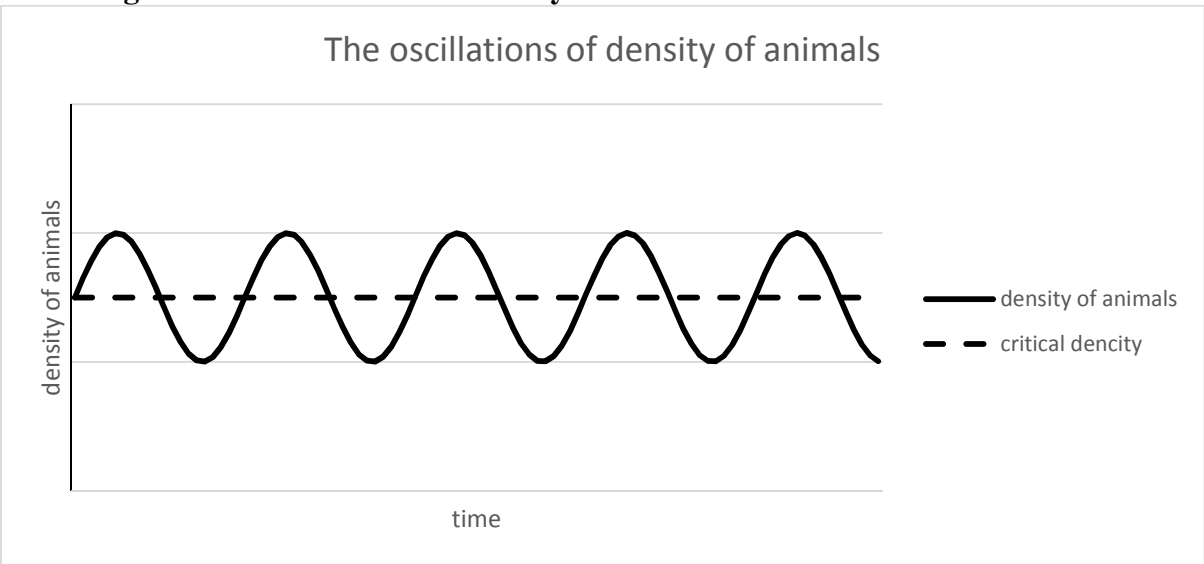
Abstract.

In this paper, history of development of preindustrial England from the fourteenth century to the middle of the eighteenth century is analyzed by applying the model of social progress. The emphasis is on interaction of demographic changes, economic development, cultural and politic events. The causes of such events of English history as the Peasant Revolt, English pre-reformation, Wars of Roses, English revolution, Restoration, Glorious revolution and beginning of English industrial revolution are explained from the point of view of the proposed model of progress.

This paper is only outline of the history of England's development. Many excellent books have been written about English economic, social and politic history. However, our subject is a history of England's *development*. The development of a country is a compound phenomenon. Different sciences consider separately economic, politic, religion and culture but a society is indivisible. Development is changes in all aspects of society life, therefore, we ought to consider them in interrelation. To understand the causes of English development I shall by application of the model of progress. Thus, first of all, I ought to state the model here.

Man himself is a product of the evolution of the animal world. Since Darwin, it has been generally recognized that this evolution resulted from the struggle for existence. The struggle for existence results in natural selection, which is a key process in the evolution of living beings. However, as Darwin pointed out: "A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase."[1]

Figure 1. The oscillation of density of animals.



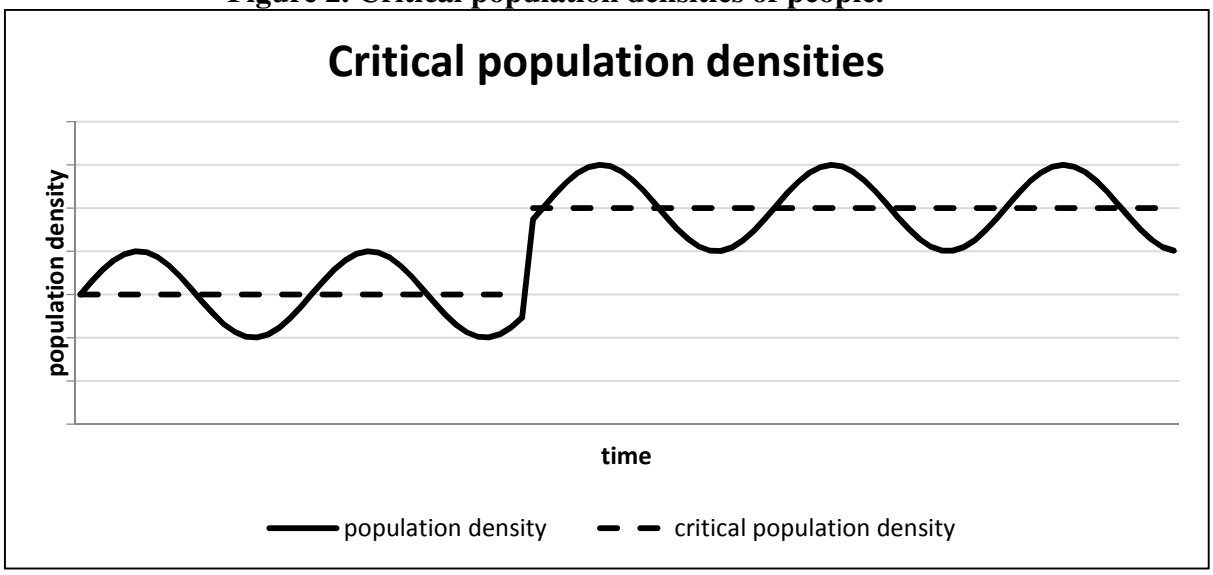
In the nature the density of animals will oscillate around average density which corresponds to some critical level above which food will be scarce. It is *critical density of animals*, which is determined by natural conditions. When density of animals is below the critical level, natural selection will reject individuals fitted to conditions of existence below average. Thus the fitness of the whole species will not improve. Only after the density of animals will exceed the critical level and the population density will be the highest, the fittest animals will survive. In this way, natural selection picks out the best adapted organisms, which

[1] Darwin (1859), p. 63.

eventually results in the emergence of new, better species. Thus exceeding of density of animal above the critical level is cause of evolution and ultimately emergence of humans.

But man, thanks to his intellect, can change the manner of obtaining the means of subsistence, enabling more people to live on the same land area. In other words, man can increase the critical population density, avoiding famine and thus averting natural selection. Obtaining more means of subsistence from the same land is possible only by intensifying land use. Therefore, for man, *the critical population density is the highest possible population density in given natural conditions at a given stage of land use intensity*. Unlike the other animals, the human species is characterized by a considerable range of critical population densities, each corresponding to a given intensity of land use. Some scholars use for this conception the term "carrying capacity of land," but I think "critical population density" is more precise because critical density marks line after which very important changes in a society will begin.

Figure 2. Critical population densities of people.



Thus the intensification of land use allows to avoid famines. The intensification may only occur by increasing the input of labour and capital in the same land area. However in preindustrial societies agricultural intensification consists chiefly in expanded labour input, because for increase of capital input level of development of the society is too low. In economic theory, when two factors of production are fixed (land and capital), the growth of the third factor (labour) results in diminishing returns to that factor, in other words the returns to the marginal increase in the supply of labour will diminish.

With the industrial revolution, however, the input of capital began to grow, together with the productivity of labour, thanks to chemical fertilizers, pesticides, farm vehicles and machinery: the law of diminishing returns to land no longer applied, and economists and historians came to see the law as a curious incident. Ester Boserup worked in preindustrial countries where the law of diminishing returns was still in force. Therefore she concluded that the intensification of agriculture led to diminishing labour productivity and therefore that the cause of development in agriculture is population growth[2].

There is one very important consequence of this thesis, which, as it seems, is overlooked. Under population pressure in order to avoid famine the population can intensify the use of land, but as a consequence labour productivity will diminish. As a result the population is subjected to harder and more regular work. Therefore, with every stage in the intensification of land use, the population is compelled to be more disciplined, hard-working, and persistent. So every transition to more intensive land use caused deep changes in people's mind and consequently in people's behaviour, so *the level of population development* will grow. From this theoretical perspective, *the level of population development represents the ability to solve life problems.* It is evidently

[2] Boserup (1965), p. 4

that any life problem may be solved at very different levels. Houses, food, clothes and so on may be of very different quality. The higher is the level of development the higher are *standards of living*. The level of development comprises not only knowledge how to solve a life problem but also the population's determination to devise the solution by whatever means. So the level of development has two components: intellect and willpower.

The increase in the population's level of development results from changes in the upbringing of a new generation in conditions of increasing labour complexity, training the child for a new, more complex life. It is interesting that anthropologists note that early agriculturists often punish their children by beating them while hunters and gatherers never do so. For hunters and gatherers it is enough for living to follow their instincts but for agriculturist it is of importance to train children to overcome their instincts and do that is necessary. Therefore anthropologists wrote about inability of hunters and gatherers to work persistently for a long time. It is not laziness it is low level of development. Europeans had to bring enslaved Africans to New World for plantations because Indians who were hunters and gatherers died quickly when forced to agricultural work. For such work they were not trained and stress killed them. It interesting that Indians who had transited to agriculture (in Andes and in mountains of today Mexico) did not die out. Finally the level of development is fully formed by the age of about 20-25 when the generation has begun adult life. After that age, the level of development cannot be changed.

Notwithstanding the fall of labour productivity as a result of intensification of land use the standard of living of the population will rise without fail. Though the labour productivity per hour or per day will diminish, the labour productivity per year will increase owning to augmentation of number of working hours. It is possible because growth of the level of development of population as a consequence of more complex labour. *The more complex people's labour, the higher their level of development.*

Throughout history, human labour activity has increased in complexity. The most primitive forms of labour are hunting and gathering. Next come nomadic cattle breeding, forest-fallow farming systems, and other forms of shifting cultivation. Genuine agriculture begins only with use of plough. Rice cultivation is very intensive sort of agriculture. Even more intensive are horticulture, viticulture, and vegetable growing.

Non-agricultural labour is usually more complex than any kind of agricultural labour. The labour of white-collar workers is usually more complicated than the labour of blue-collar workers. The most primitive forms of non-agricultural labour include mining, retail trade, construction and transport. Much more complex is machine-building. Next follows the labour of white-collar workers: civil service, engineering, finance, banking, education and so on. The most complex work of all is science.

Thus, the structure of a population's employment is the main criterion for determining the level of social development. From this point of view, human history may be divided into three periods, corresponding to three qualitatively different stages in the structure of employment. During the preindustrial stage, the first and longest, the majority of the population worked in agriculture. The second stage began with the industrial revolution, ushering in an industrial society in which the majority worked in industry, trade and other non-agricultural activities. In the third stage, post-industrial society, the majority of the population are white-collar workers who have higher education. Thus the theory proposed here, gives accurate criterion for transition to different stages of development. For example, the transition to industrial society is complete when above fifty per cent of population is engaged in non-agricultural working activities.

The population's level of development corresponds to the level of needs and standard of living. Of course, people may say they want a better life, but to live better they have to work harder. The choice of harder and longer work for better living conditions follows from higher levels of development. This is a key postulate to understanding economic growth. It is universally recognized that the sole driver of economic growth is an increasing level of needs.

According to the theory proposed here, people will work just to satisfy an achieved level of needs, which corresponds to an achieved level of population development. As a consequence, in preindustrial society the growth of output did not result in consumption growth but in Malthusian population growth. This thesis explains why in many countries people are happy though from our point of view they live in extreme misery. They are happy because production meets their needs, no matter how low they are.

The level of needs consists not only in the material needs as for example food, clothes and shelter but also includes nonmaterial needs. According to Maslow[3], once the biological needs for food, water, sleep are fulfilled, human beings need safety (security, order and stability). The level of security and order is determined by the organization of the society. The higher the level of population development, the better the organization of social life, because the higher level of population's development made it possible more complex social institution to come in existence.

But in our theory needs increase only in conjunction with the level of development, which in turn stems from more complex labour activity. Thus the model explains why hunters and gatherers, shifting agriculturists or nomads cannot found a true state. Their upper limit is a tribe or union of tribes only. State for them is impossible because these forms of labour do not generate a high enough level of development. Hunters and gatherers, shifting agriculturists and nomads simply cannot support a state social order – they lack the discipline. In this way the model shows the connection between social institutions and structure of population's employment.

One of Marx's assertions, which, as it seems, penetrated into many scholars' works, is that for the development of social institutions the surplus product is needed. It seems evidently that people of higher social strata, who came into existence as a consequence of occurrence of such institution, lived due to the surplus product only. Marx thought that the product is a result of labour productivity growth, as in hunter and gatherers' societies the labour productivity was extremely low, no surplus product was possible therefore no social institutions existed. However as anthropologists' research showed hunters and gatherers could produce means of subsistence well above their needs[4] but their social organisation always was very primitive. Social institution will come into existence only when population will need them.

As we have observed, progressive changes in a society begin only after critical population density had been exceeded. As the land of every country is limited, it may be considered as a *reservoir* with capacity equal to the critical population density times the land area. The ratio of population density of the reservoir to critical population density is equal to a *critical coefficient* of the reservoir. *The reservoir is full* when the population density is equal to the critical density or critical coefficient equal to 1. Further population growth leads to a decrease in the standard of living below the correspondent level of development. Such situation cannot endure, making some changes to the society are inevitable.

The possible changes may be described by the *three laws of reservoir*. The first law is *the population pressure in the reservoir is counterbalanced by pressure in neighbour reservoirs*. Too high critical coefficient forces population to try seizing neighbouring land in order to avoid the intensification of land use. Will migration occur or not depends on critical coefficient and number of people in the neighbouring reservoir. The first law may be called the *law of migrations.*

The first law of reservoir was very important in early period of human history. Due to the law the people occupied all surface of the Earth. Especially important is the first law for understanding cases of decline in ancient civilisations as, for example, the Minoan civilisation on Crete, the Mycenaean civilisation, the Harappan civilization arose in the Indus valley, decline of some states in pre-Columbian America. In all the cases the indications of deep decay

[3] Maslow (1950), pp. 370-396.
[4] Salins M. (2017), p. 38fl

(abandonment of towns, written languages were forgotten, stratification of society vanished, ceramics and other handicrafts became much more primitive, objects of foreign trade fell into disuse) were accompanied by signs of great depopulation but with any signs of invaders. However in all the cases there were traces of massive migrations from core territories to peripheries. According the first law of reservoir the population migrated from densely populated lands to more sparsely populated ones that allowed them to practise more extensive land use with higher labour productivity. Therefore the more severely migration from a reservoir is hampered by natural conditions, the more favourable it is for progress.

The second law is *the smaller the reservoir, the more quickly it is filled, but also the smaller it is, the less potential for progress.* The progress occurs only when the reservoir is full thus more capacious reservoir will lag behind less capacious reservoirs. However, the more populous society has more opportunities for division of labour, the bigger its market is, and the more progress the society can achieve. Thus after filling the more capacious reservoir will outstrip the less capacious one. The second law may be called the *law of change of leader*.

The second law of reservoirs explains the faster development of less capacious reservoirs. For example, according to the law European civilization had to arise in the Mediterranean, the region with the smallest human capacity; and within the Mediterranean region, the first civilization had to come in the area with the most limited capacity: the Minoan civilization on Crete. Further, in keeping with the second law of reservoirs the center subsequently moved to Greece. The second smallest Mediterranean peninsula is the Italian, and this is where the next European center of development was inevitably situated Antiquity. In the Middle Ages the European center of development was peninsular Italy but in early Modern Times it moved to the European North-west to more capacious reservoirs – England, France, and Germany during the modern era. Today, we can all observe the shift of economic centers to East and South Asia, with the world's most capacious population reservoirs, China and India.

The third law of the reservoir - *a rise in the critical coefficient causes the growth of social tensions, the acceleration of economic development, and centralization of power. A decrease in the coefficient produces the reverse processes.* The third law determines correspondence between the critical coefficient and many aspect of life of society, so the third law may be called the *law of correspondence*.

The growing critical coefficient causes many important changes in a society. It is well known from time of Malthus that in this case real wages will diminish while prices will grow. That these processes cause grow of social tensions is understandable. However that it causes the strengthening of central power is often overlooked. Nevertheless, it is of importance for understanding of political history. For example, anthropologists collected many evidences that tribes, which practised the same type of land use, had very different type of social leadership: from Big Man system without formal authority to chiefdoms with hereditary and strong power. The cause of such differences is different height of the critical coefficient.

Another example is evolution of central power in France during the Middle Ages: from the twelve century population of all Europe, including France, was growing steadily[5] and by the thirteenth century the critical coefficient was high enough to strengthen central power in France after some centuries of its weakness. The turning point for the rise of central power was reign of Phillip II Augustus (1180-1223). After him, the power of French monarchy was steadily expanded even more and reached its strongest level under Phillip IV the Fair (1285-1314). Just after his death the critical coefficient had become too high and famines, epidemics and wars had begun. The French population began to diminish as well as power of its monarchs. Only when population again began to grow from the middle of the fifteenth century the anarchy in the country was supressed and Lois XI had begun new period of centralisation.

If according to the first law the permanent migrations were possible then the critical coefficient never was high enough, the central power may be weak century after century as it

[5] D.H. Fisher (1996), p. 17-23.

was in Germany since beginning of mass migrations of Germans to the East. It was the only cause why Germany was not centralized until 1871.

Thus, the intensification of land use is the only way for progress to occur in preindustrial societies. However, the agriculture cannot intensify infinitely. Eventually, further intensification of agriculture becomes impossible for natural or economic reasons. In this case, the filling of the reservoir will be the *last one*. Every time the reservoir is filled, according to the third law, there will be social disturbances. But after the last filling a revolution begins. It is *peasant revolution caused by the filling up of the reservoir for the last time*. This type of revolution may occur only in countries where peasantry comprises the majority of the population (60–90%), or in other words, in preindustrial societies.

So far as before revolution critical coefficient grows quickly, according to the third law, the economy of the country develops especially swiftly. The level of development rises, therefore the country's culture, education and art thrive. The power of monarchy becomes absolute. However, when the reservoir is filled last time and the critical coefficient is too high, real incomes of the majority of population decreased often down to biological limit that causes difficulties for economy. Population continues to grow and with every year life becomes worse. Gradually all social strata become discontent and even the highest one. Instead of supporting government, elite opposed it. Absolute power of monarch turned to persistent conflict with society's elite. Now it is enough even small case to begin revolution.

During the pre-revolutionary period, the society tries to understand why life is deteriorating and what it needs to do to improve the situation. In such way the ideology of future revolution is formed. The ideology must be understandably for broad masses of population. All revolution ideologies may be of two sorts: it can be religious ideology, as it was in the Netherlands in the 1570s, in England in the 1640s, and in Iran in the 1980s or leftist ideology as in France in the 1790s, in Russia in the 1910s, and in China in the 1930s and 1940s.

The main thesis of any religious ideology - people with their sins angered almighty god; therefore, he punishes us. In order to make life better the people have to repent and to reform themselves. Authorities are main sinners; they do not want to repent and prevent people from reforming. Therefore, the authorities must be changed. Today's Muslim extremists are revolutionaries. They want to create god's kingdom on the Earth, where all true believers will be happy. For such great aim all means are good. The Muslim extremism is typical revolutionary ideology.

The main thesis of any leftist ideology is simple too – many people are poor because few are very rich. Wealth is enough for all but distributed unequally. Redistribution of property is necessary to make the life of majority of people better. It is interesting to note that both ideologies are interdependent: very often the religious ideology presuppose the property redistribution because god do not like rich while to live in poverty is good for salvation of soil. The leftist ideology practically always includes religious elements: blind faith in holy scriptures of prophets as Marx, Lenin or Mao Zedong, cult of revolutionary martyrs, sacred rituals and singing of hymns.

Practically always the revolution begins on the top of the society but very quickly it going down the social pyramid. Every step down caused radicalisation because the lower is a social stratum the more radical it is. Besides the lower social stratum the more people it contains therefore, it more influences the revolution process. As a result, with the deepening of the revolution process the society becomes more and more radical. Elite of the society wants redistribution of power between itself and monarch. The middle sort of people wants more liberty in both politics and economics. The most numerous low social stratum wants to raise its standard of living by political means, specifically through revolution by redistribution of property. According to the proposed model, this is impossible because the standard of living could only rise in conjunction with the level of development.

As the low stratum is involved in the revolution process, they begin to force revolutionary leaders to make changes in base economic regulations: redistribution of property, first of all,

land; expropriations, the fixing of prices, etc. The leaders, who usually come from educated strata, because the broad masses in preindustrial societies are ignorant and illiterate, usually oppose. Nevertheless, if they will not do it, it will be done without them. Such changes lead to civil war, because higher social strata lost their wealth. The society divides socially and geographically because different regions of the country are in different state. As a result of intervention in economics and civil war, living standards deteriorate swiftly. At the same time, political struggle and civil war encourage anarchy and criminality. At this time, the population becomes disenchanted with the revolution as a means to improving life, and society seeks order at any cost. The social need for the centralization of power leads to personal dictatorship, which has power much more absolute than the pre-revolutionary monarch had. Who will win the struggle does not matter. It may be a revolutionary and military leader like Cromwell, a general like Napoleon, or a schemer and bureaucrat like Stalin. The matter is not personal qualities but social need for strong hand to supress anarchy. In any case, revolution usually culminates in personal dictatorship and the repression of all the revolutionary liberties achieved. This is end of any peasant revolution. Every peasant revolution doomed to failure because its main aim is unrealisable.

After the revolution, population growth gradually compensates for population losses and the reservoir is filled once more. There are now three possible courses of development:

1. Transition to a stationary state.
2. Transition to external opportunities for development.
3. Transition to industrial society.

If there are no possibilities for further development after the last filling of the reservoir, then the society inevitably shifts to the stationary state that is *a state of a preindustrial society in which in the long run it keeps approximately constant population.* Insofar as further intensification of land use is impossible, the society in the stationary state cannot progress. We have economic and cultural stagnation. The level of development of such societies may stay unchanged for hundreds and even thousands of years. In societies with a low level of development, the adjustment of population growth to the means of subsistence occurs mostly via mortality or by positive checks, as Malthus says. In such societies, as in the animal world, population oscillates around the critical density. When it goes above that level, the predictable result is war, famine, or epidemic disease.

In more highly developed societies, population growth is checked mainly by methods that affect marriage and fertility or by preventive checks, again according to Malthus. Marriage will be delayed, so the reproductive period is shortened and the number of births per woman is reduced. Another, more radical solution is an increase in the proportion of people who never marry, which may go as high as 30%, which inevitably causes population growth to cease. In these societies too the population will oscillate around the critical density, but when it goes above that level the birth rate will fall to bring population back below the critical level.

First civilisation on Earth, for example, Mesopotamia and Egypt stopped to develop and shifted to stationary state very early, because all their resources for further progress were exhausted. Progress of the society in the stationary state is possible only through influence of the external world.

One variety of such influence is external opportunities for development. *The external opportunities for development are defined by trade with other reservoirs.* In a preindustrial society, trade has some peculiarities. It may be defined as either real trade or élite trade. *The real trade involves the products of division of labour while* t*he élite trade is a trade in goods that emphasize the high social status of their owner.* The external opportunities for development stem from the élite trade. Examples of states that developed thanks to the external opportunities were some states of an cient Greece, whose own reservoirs had minimal capacity (Athens, Corinth, Megara); some city-states in medieval Italy (Pisa, Genoa, Florence, Venice); and, in early modern times, the northern Netherlands.

The goods of elite trade were typically expensive clothes made from high-quality textiles, or jewellery. A well-dressed man was seen at first glance to belong to the upper stratum of the society. The main quality of the élite goods is their inaccessibility for broad masses. That is they have to be very expensive. The demand for elite goods is paradoxical because customers want to buy more expensive goods. Therefore, the seller of élite goods always had super profits but he should have been a monopolist. Competition would cause a fall in prices and the loss of the élite goods' status. As a result, there was a never-ending struggle among states engaged in élite trade, as it was among Italian city-states during the Middle Ages.

The élite trade enabled these societies to increase the proportion of the labour force outside agriculture, which raised the level of social development considerable. However, according to the second law, eventually the more capacious reservoirs were filled and less capacious reservoirs could not withstand the competition. The economy of the society exploiting external opportunities would collapse and development would cease, as in Italy in the 17th century or Holland in the 18th.

Thus, the transition to an industrial society - industrial revolution - is the only way to ensure permanent progress once the reservoir has been filled for the last time. The transition is possible only after the peasant revolution when population exceeds critical coefficient again. However, in this paper we shall consider only pre-industrial period of the development of England therefore for analysis of industrial revolution there is no place.

Perhaps England is the best country for verification of the theory of development. Until the seventeen century, the country was backward European periphery. The population was sparse. The population density of Italy was 44 per sq.km., the Netherlands about 39 per sq. km., while population density of England was only 19[6]. According to the proposed theory, the low population density is indication of backwardness. Practically in all realms of life of the English society, progress depended heavily on imports of more sophisticated technologies from the continent[7]. Nevertheless, the first industrial revolution on the Earth had occurred in England. Many talented and prominent scientists studied the causes of leading development of the country in the eighteen and nineteen centuries, but it is impossible to say that today we understand them completely. The period of England's development before the industrial revolution is important for understanding the causes of the revolution.

As far as demographical processes are very slow and progress in a preindustrial society as their consequence is even slower this paper covers large span of time – from the fourteenth century to the middle of eighteenth century – there no space for any historiographical considerations. Therefore, I shall state only my conclusions about historical events by application my theory of progress without analysis of historical discussions.

According to the model of development, the population dynamics were the main cause of all basic changes in a pre-industrial society. From 1547 onwards, we have reconstructed dynamics of the English population owning to the fundamental work of E.A. Wrigley and R.S. Schofield[8]. For the earlier period, we have only price series but as is known from time of Malthus the dynamics of prices corresponds to population dynamics, that was proved by Wrigley and Schofield for England[9]. Certainly, it is incorrectly to identify the price dynamics and population one, but in some extent their trends must concur.

[6] P. Williams (1995), p. 2.
[7] E. A. Wrigley (1990), p. 7.
[8] E. A. Wrigley, R.S. Schofield (1997).
[9] *Ibid.,* p. 404.

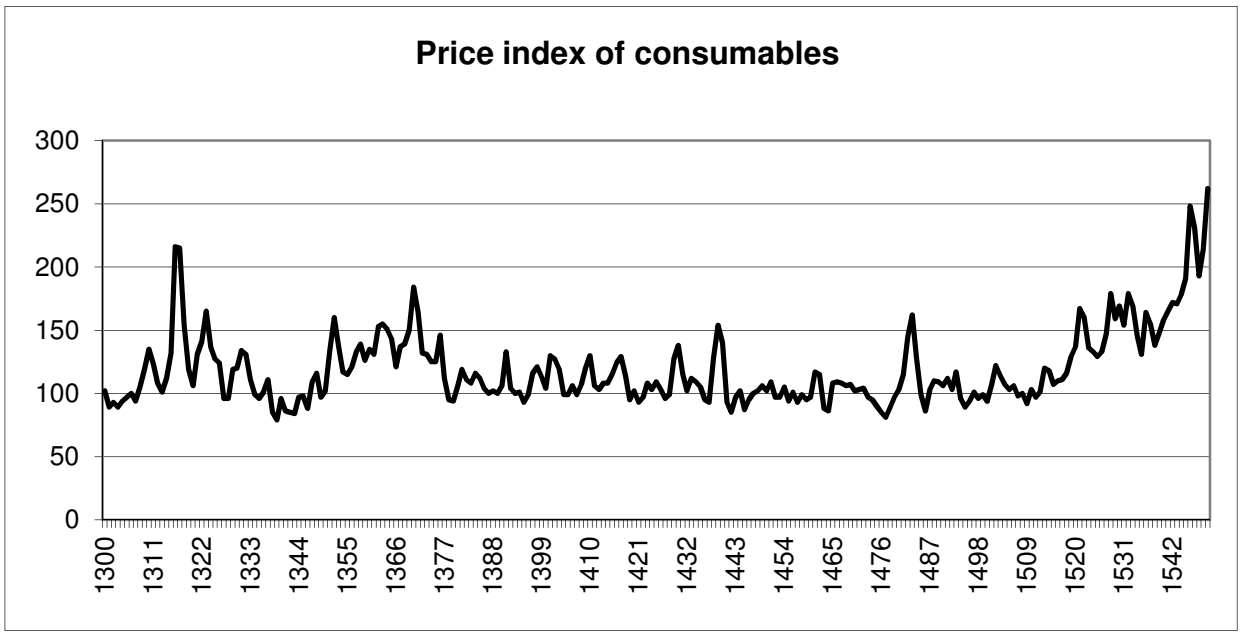


Figure 3. Dynamics of English prices. Source E.H. Phelps-Brown, S. V. Hopkins.

Thirteenth century was time of population growth in all parts of Europe[10]. As we can see on figure 3, prices, hence the population, reached local maximum in the period 1310-20s. It was time of the great European famine of 1315-1317[11], that corresponds to action of positive check, according to Malthus. After that, population had decreased and reached its local minimum in the end of 1330s – first half of the 1340s. Afterwards new wave of population growth followed with maximum in 1360s. From the second half of the 1370s the population decreased. Such population pattern allowed us to make some conclusions.

First of all the population decline was not caused by the Black Death because the decline preceded the epidemic. It is interesting that even the Black Death, as it seems, did not cause population decline for a long time. On the contrary, population quickly increased after the epidemic. Such cases were typical[12], because under high critical coefficient part of population was excluded from the reproductive process. After epidemic, the reserve population replaced the dead in marriage market and the birth rates increased quickly. Already by the mid of the 1350s there had been widespread re-tenanting of land. In some places new tenants came forward so quickly that there was scarcely any discontinuity of occupation[13].

From the point of view of the proposed model in the fourteen century filling of English reservoir had occurred. Population density exceeded critical density considerably and population growth must be stopped in one way or another. As it seems the stopping of the population growth was caused mainly by increase in mortality (positive check: epidemics and famines), but not only. The preventive check or reduction of nuptiality with following fall of fertility was operated too. Because lack of data we cannot determine the degree of influence of every checks on population but quick recovery of population growth after the Black Death is evidence of importance of the preventive check.

It is interesting to note that the second wave of population growth in 1350s-1370s was as high as the first one. It is not an accident. The height of the price wave corresponds to number of people living in England and this number was limited by the capacity of English reservoir. In both cases the capacity remained the same, hence the height of the waves was equal. Not the Black Death, which may be accidental, but strict necessity to accommodate the population to the

[10] D.H. Fisher (1999), p. 19.
[11] I. Kershaw (1973).
[12] E. A. Wrigley, R.S. Schofield (1997), pp. 333, 363.
[13] Britnell R., Dodds B. (2009), p. 22.

capacity of reservoir was cause of the population decline. It is especially evident for the second wave when there was not such devastating epidemic as the Black Death.

The two waves have some more common features. During the first wave, the One Hundred Years' War had begun in 1337, during the second one the Great Peasant's revolt had occurred in 1381. As it seems the two events have nothing in common, nevertheless they are phenomena of one cause. The both cases were a result of very high critical coefficient and both cases occurred not in the time of maximum of the waves but when the population trend turned downward. The beginning of the diminishing of population was the hardest time for the people because in this time the both checks on population had begun to operate in the full extent, otherwise the population would not diminish. The mortality increased, while nuptiality decreased. For the broad masses of population it was a gloomy perspective to live without family and own house for life, therefore the social tension in the time reached its apogee.

The success of Englishmen in the first half of the One Hundred Years' War was possible only because life of thousands of English peasants had become too hard. They joined English army for loots in order to avoid starvation at home. Just English peasants were a main power, which gained victory by victory. Certainly, the knights experienced the hard pressure of high critical coefficient too but it is well known that in the great degree English armies gained victories due to rank-and-file bowmen.

Another case was the great Peasant's revolt. The Peasant's Revolt was a result of disappointments and irritation of the majority of peasants due to problems caused by the high critical coefficient. In the middle of the 1370s, as we can see on the figure 3, the prices were high; hence, the population density was high too. Afterwards the population had begun to diminish quickly. It means that just in this time, many peasants had gave up hopes for marriage and own home. In these circumstances, the Revolt was provoked by processes, I shall try to describe as follows.

During period of long population growth in the thirteen century many and many peasant's sons became landless. Therefore, they have to work for wages. The wage labour is much more effective than the labour service of serfs hence the landlords cultivated their demesnes mainly with wage labour. In this situation there was no need for serfdom and it had begun to die out. The heavy losses of population caused by Black Death frightened landlords and Statute of Labourers was issued but quick increase of population allowed the landlords to pin back wages. However, after the decline of population in the end of the 1370s had begun, the deficiency of hired labour had become appreciable and wages had begun to grow. Landlords tried to make labour service compulsory for their tenants. The falling critical coefficient reversed economic processes, and if the fall was too deep the enslavement of peasantry was only way to preserve social structure of society. For example, in Russia peasantry was enslaved after conquest of vast tracts of land in the south and mass migrations of peasants in the steppes in the seventeenth century. However, in England the decrease of critical coefficient was not so deep while the achieved level of development of English peasantry was high enough to prevent the re-enslavement. It is not an accident that rebels demanded in the first place the abolition of serfdom. We know from the Anonimalle Chronicle the demand of Watt Tyler that "no man should be a serf, nor do homage or any manner of service to any lord…and that no one should work for any man but at his own will , and on terms of a regular covenant"[14], though serfs by blood formed a relatively small minority of the rural population of the south-east[15] where the revolt happened.

Thus, the endeavors of the landlords to enslave peasantry in one way or another was a provoking factor. Besides, the English society had many grounds to be discontented with government. Among these were failures in the war with France, damaging raids of French on the Channel coast and especially the grant of parliament, a shilling a head, three times its previous

[14] V.H. Galbraith (1927), pp. 144-145.
[15] C. Dyer (1984), p. 26.

level that led directly to the Peasants' Revolt[16], though the achievement of personal freedom and the abolition of labour services concerned peasantry before the 1381. The parliamentary petition of 1377 speaks of fear of civil war and danger of general peasant rising[17]. Nevertheless, all these provoking factors could not cause such great revolt if not very high critical coefficient.

Notwithstanding the fact that the revolt was suppressed, an assertion that it to a large degree promoted stopping of seigniorial reaction, stands upon firm ground. If in time of the revolt, the most demesnes were under direct management of landlords[18], then after 1381 the process of leasing of the demesnes had become universal[19] because nor economic nor politic conditions made it possible to manage them directly by compulsory labour service, while wage labour force had become too scarce.

One more feature of the period of the high critical coefficient was English pre-reformation. According to the third law the religious seeking and striving in time of high critical coefficient was a usual phenomenon. The people believed that god is almighty; hence, all happens only according to his will. If life of people has become worse, then it is because god punishes the people for their sins. In order to make life better the people have to repent and to reform themselves. To reform himself means to reform church too. Many preachers who know how to live without sins come into being. In such way events developed in Italy and south France in the thirteen century, in Czechia in the beginning of the fifteen century, in the south Germany in the beginning of the sixteen century and in the Netherland in the second half of the sixteen century; always when the reservoirs were filled for last time and revolutions followed. In the fourteen century English reservoir was filled that caused religious seeking. "In the fourteen-century England, the growth of conscious, articulate and sometimes puritanical moral fervor among the laity was a marked feature of the age"[20]. From the period, many religious writings survived contrary to previous period that reflect the interest for the subject.

So the Wycliffe teaching fell on fertile ground. For our research the ideas of Wycliffe are interesting not only in themselves but the consideration of English society for them. It is evidently that Wyclifite teaching commanded some sympathy both with gentlemen and ordinary people. Even parliament of 1410 put a bill proposed to confiscate church property, undoubtedly inspired by the Wycliffe ideas. However, from the beginning of the fifteen century the popularity of Wycliffe teaching declined in conjunction with the critical coefficient. The problems, caused by high critical coefficient, ceased to disturb people; therefore, there was no need for the religious seeking and striving.

As was mentioned above, in 1320s – 1380s English reservoir had been filled but it was not a last filling because there were many possibilities for further intensification of agriculture. English peasantry chose the decrease in nuptiality not intensification of agriculture. The critical coefficient had begun to diminish as well as all kinds of people's activity. The dynamics of prices (figure 3) give us ground to assume that population decreased considerably.

That the fifteen century was a period of population decline is known from time of publication in 1950 the article "Some agrarian evidence of declining population in the late Middle Ages" by M.M. Postan[21]. Postan made the assumption because the rise of wages and fall of rents and land prices in the period after 1350s. Since the time many facts were collected which corroborate the population decline. Perhaps the most convincing is reduction of number of country settlements[22]. As always when the critical coefficient was falling, the prices, value of land and rents fell while wages rose. The development of English agriculture in the time corresponded to the third law of reservoir. The land use become more extensive, the arable was

[16] M. H. Keen (2004), p. 208.
[17] R. Faith (1984), p. 43- 74.
[18] C. Dyer (1984), p. 23.
[19] M. H. Keen (2004), p. 149.
[20] *Ibid,* p. 177.
[21] M.M. Postan (1950).
[22] M.W. Beresford, J.G. Hurst (1971).

converted to pasture[23] because it was more profitable under the fallen critical coefficient. All kinds of population activity in the time were at the lowest level. The English economic was in deep decline, exports of cloth diminished[24].

All above-mentioned processes are well known to scientists and I enumerate them only because they correspond exactly to the proposed model. However, one phenomenon of the fifteen century is not, as it seems, they connected to the population trend. I mean the Wars of Roses. The causes of the political events scientists saw in dynastic problems, defeat in the Hundred Years' War, in economic and financial crisis in the rank of nobility. At the end of the twentieth century the causes of the wars they seek in the long-term shift in the balance of political power between the Crown and greater subject or in the shortcomings of Henry VI as king[25].

I think the cause the Wars of Roses was the deep fall of critical coefficient. The prices, as we can see on the figure 3, were minimal in the period 1445-1480. It was time when the wars happened. The beginning of the wars lagged for ten years that is natural for social processes. The very interesting feature of the period was not only minimal prices but also their very low volatility. Such stable prices there were not in all period of price dynamics in question. Traditional primitive agrotechnics of Middle Ages could not withstand weather uncertainty therefore crop failures were in the usual run of things. Every such failure caused a leap of prices that may be seen at the figure 3. It is impossible that during 45 years there was even if one year when weather was bad. Hence, the lowest critical coefficient allowed peasantry to produce grain with such considerable reserves that even in the bad years the prices were low. Besides, just in the middle of the fifteen century the economic decline was maximal[26]. In agriculture the processes of extensification reached their apogee[27]. In the middle of the fifteen century cloth export collapsed and all English cloth-making was in deep crisis[28]. In the words of John Hales writing in 1549 "The chief destruction of towns and decay of houses was before the beginning of the reign of Henry VII"[29]. These facts allow us to assume that during 1445-1480 the population trend reached its nadir.

According to third law of reservoir, the low critical coefficient caused weakening of central power. Just weak power of king had as an evident result the disorder and lawlessness in England, which featured the period. The magnates waged wars among themselves, robbed churches and abbeys, to say nothing of ordinary people. The striking easiness with which state power in England was assumed and lost by opposite parties during the Wars of Roses was evident result of the weak central power. In its turn, the weak state power was a result of passiveness of English population. In the conditions of the low critical coefficient, people did not needed strong central power. In the course of the Wars of Roses, the broad masses of population stayed indifferent to fighting of Lancastrians and Yorkists. It is interesting to note that population could act vigorously when its interests were in question as it was in time of Jack Cade's rebellion. The king could not suppress the rebellion but the citizens of London could defeat the insurgents because their houses were sacked.

Certainly, Henry VI was ineffective king but there are many examples when under feeble or insane kings, state had strong central power. Edward IV, about whom nobody can say he was feeble and irresolute ruler, could not control the state until 1471. The situation in England changed in the main only from the beginning of the 1480s when Henry VII had come to power. As we can see on figure 3, it was time of first changes in the prices, consequently, the population trend turned up. So, the maximal weakening of central power coincided with the minimum of

[23] P. Williams (1995), p. 190-191.
[24] A.R. Bridbury (1982), p. 116.
[25] A.J. Pollard (2013), p. 60.
[26] *Ibid,* p. 69.
[27] E.B. Fryde (1996), pp. 145-168.
[28] J. N. Hare (1999), p. 1-26.
[29] J.Thirsk (1967c), p. 213.

population, while the strengthening of central power coincided with the beginning of population growth. It correspond the third law of reservoir perfectly.

The time of Tudor rule was a time of great wave of population growth. The price dynamics from 1480s to 1540s show, for the first time since the beginning of the fourteenth century, clear tendency to grow, which is especially evident from the 1510s onward. The growing critical coefficient changed situation in England in the main. The state power under the first Tudor was much stronger than in time of the last York though Henry VII had to suppress several rebellions. Even stronger was the power of Henry VIII who made the royal power absolute. It is not an accident because time when Henry VIII had come to power coincided with the beginning of stable and quick growth of prices. Just from this time English economy begun to revive. The textile industry begun to grow and export of wool and cloth increased [30].

As was mentioned above, from 1541 we have practically all demographic details, which are very important for our research. On the figure 4 English population totals are showed.

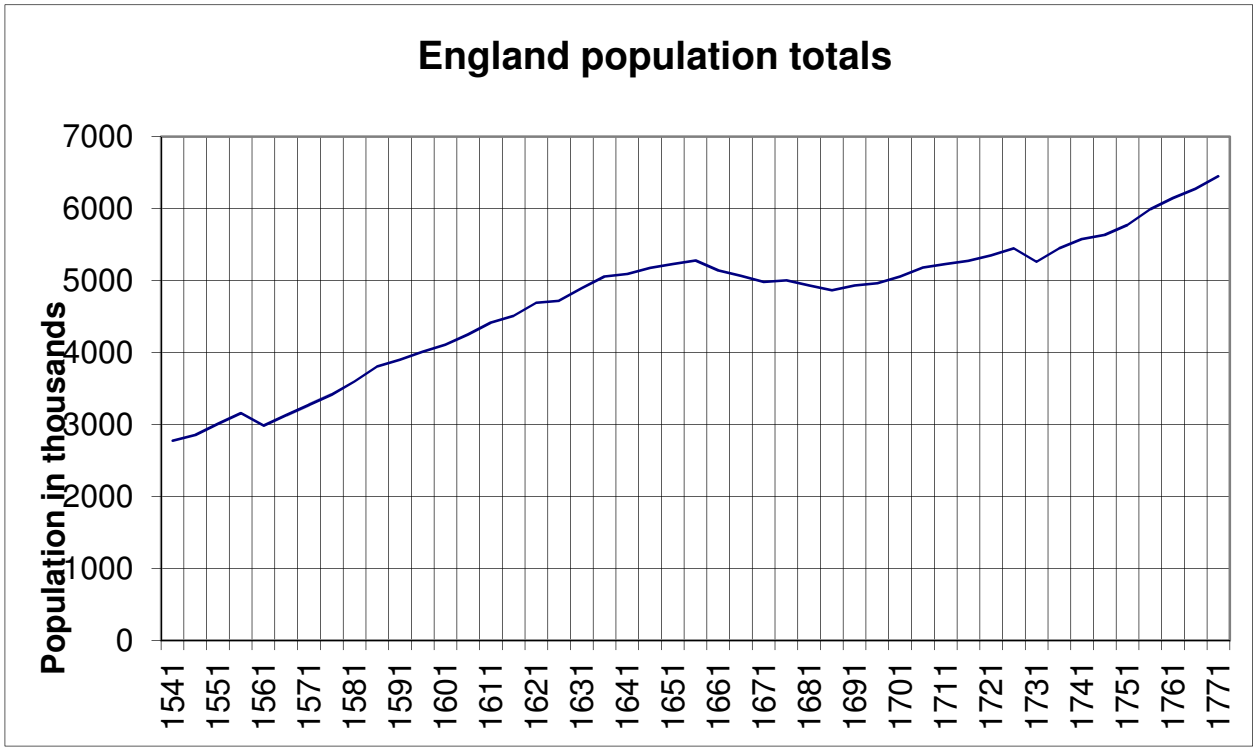


Figure 4. English population totals. Source: E. A. Wrigley, R.S. Schofield Table A3.3 pp. 531-535.

As we can see on figure 4, all the period of Tudor rule population of England increased steadily. It is possible to note two feature of population growth during that time: first, it was mortality crisis in 1557-1559 when death rates were the highest and population decreased by six percent; second, it was diminishing the rates of natural increase of population since the mid-1580s.

[30] J. N. Hare (1999), p. 1-26.

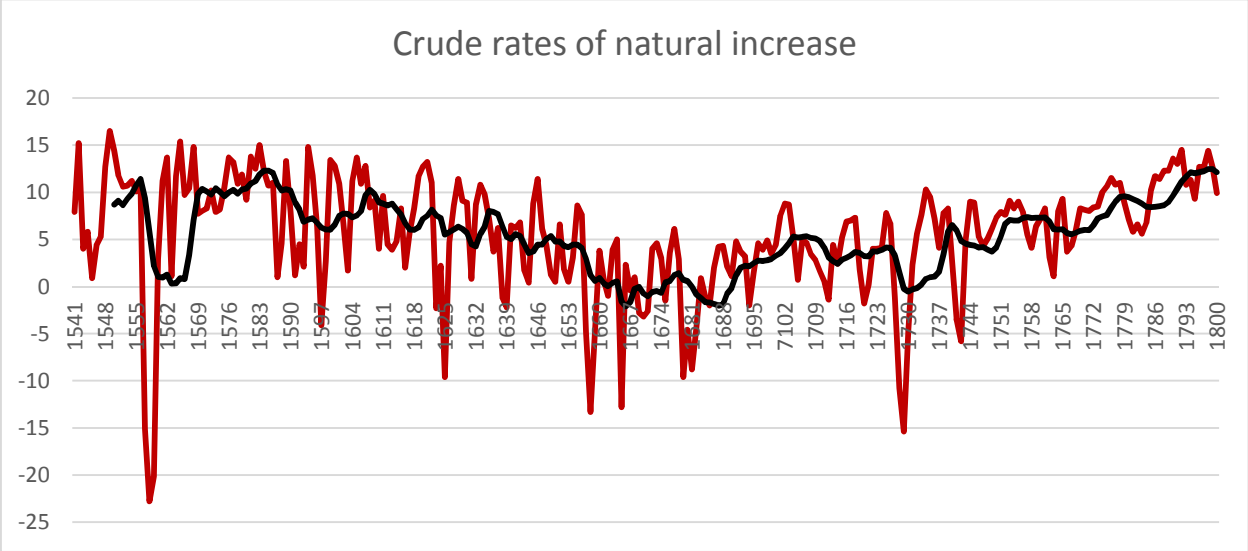


Figure 5. Crude rates of natural increase. Black line - ten years moving average. Source: E. A. Wrigley, R.S. Schofield Table A3.3 pp. 531-535.

Figure 5 provides evidence of fall in rates of natural increase from 1583. Before that point the average rates of natural increase were above 10‰ (except for the period of demographic crisis in 1557-1559), after that they had fallen to level of 7-6 ‰ by the end of the century. Annual rates fluctuated from 14-13 ‰ to 1 ‰ and even to -4 ‰ as it was in 1597. The decline in rates of population increase in the last 20 years of the sixteen century was caused not by growth of mortality because death rates in this period were the lowest and increased only slowly from the 1580s that may be seen on the figure 6.

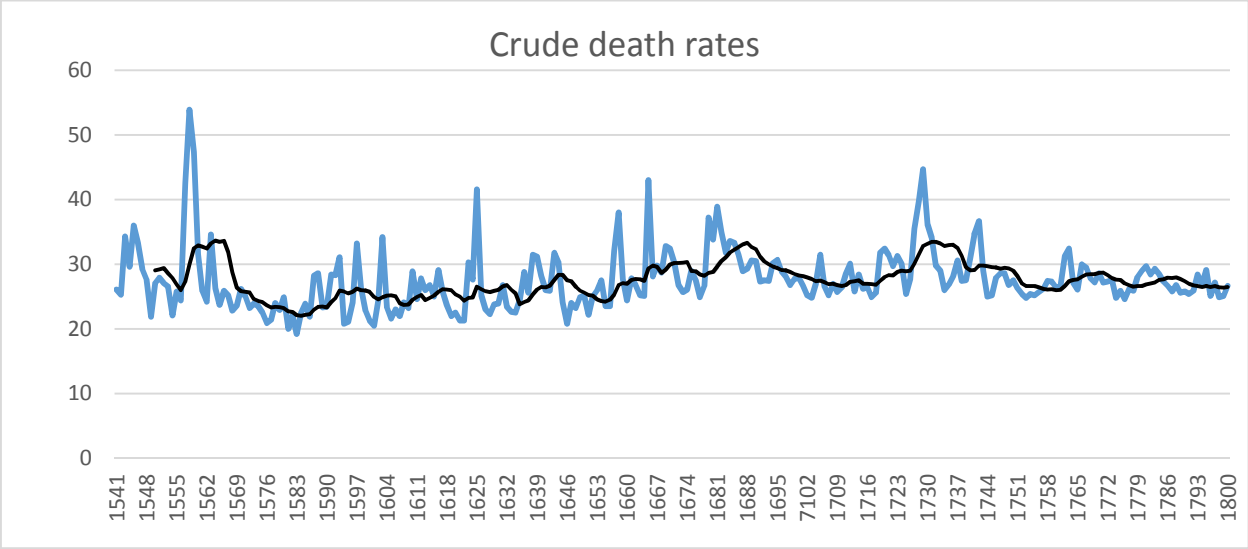


Figure 6. Crude death rates. Black line - ten years moving average. Source: E. A. Wrigley, R.S. Schofield Table A3.3 pp. 531-535.

The main cause of the diminishing of the rates of increase of English population was fall in birth rates, which occurred in the end of 1560s as figure 7 testify. In their turn, the birth rates had begun to diminish in the time because the decline of marriage rates from the very beginning of 1560s (Figure 8).

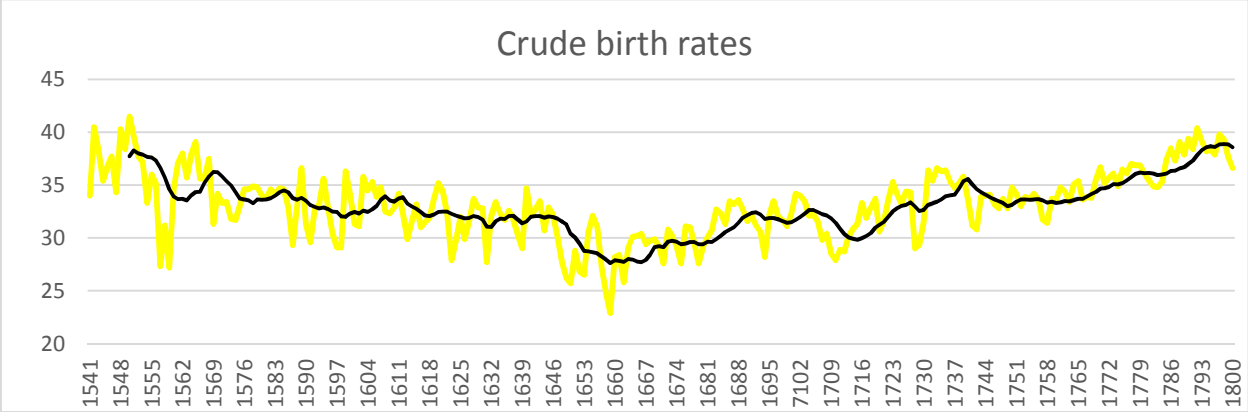


Figure 7. Crude birth rates. Black line - ten years moving average. Source: E. A. Wrigley, R.S. Schofield Table A3.3 pp. 531-535.

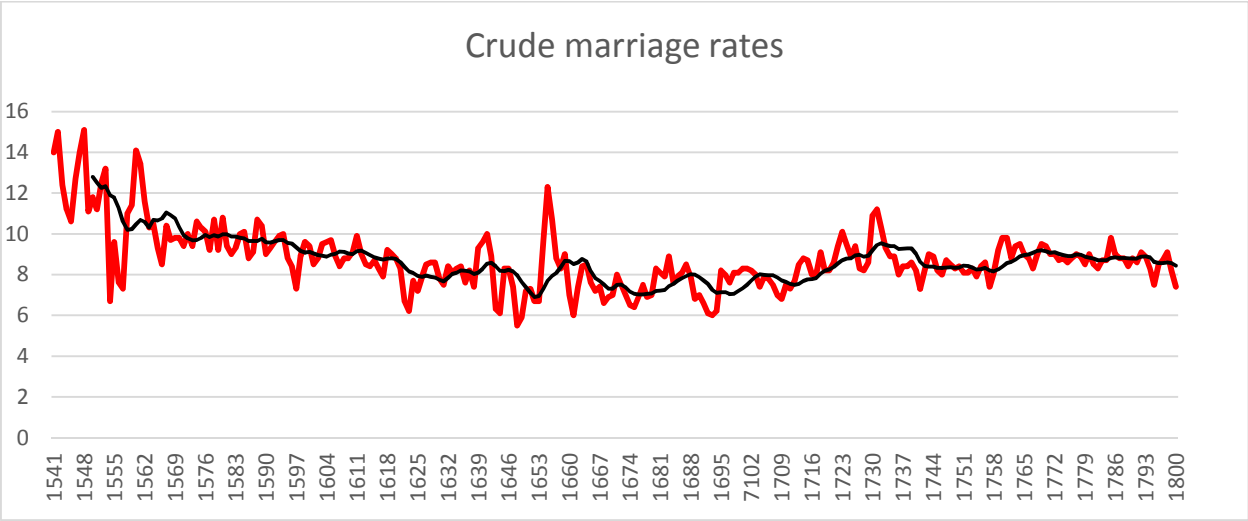


Figure 8. Crude marriage rates. Black line - ten years moving average. Source: E. A. Wrigley, R.S. Schofield Table A3.3 pp. 531-535.

As Wrigley and Schofield proved in the early modern England marriage behavior had a primacy in directing the population growth[31] therefore the decrease in marriage rates preceded all other factors.

Thus, in 1557-1559 the most severe in the sixteenth and following centuries English death crisis occurred. Then in the beginning of the 1560s the marriage rates had begun to diminish that had lowered the birth rates in the end of the decade. Consequently, in the mid of 1580s the rates of natural increase had come down. However, the most interesting is that real wage index (figure 9) just from the middle of the 1560s had grown up in about 20 percent in comparison with previous period. As Wrigley and Schofield showed, in early modern England the real wages fell when population increased[32]. It is true that the mortality crisis diminished population considerably but the losses were compensated by the middle of 1560s while the wages began to lower only in the beginning of the 1570s and had reached the level, which was before the crisis only in the 1590s.

[31] E. A. Wrigley, R.S. Schofield (1997), pp. 257-267.
[32] *Ibid,* pp. 402-412.

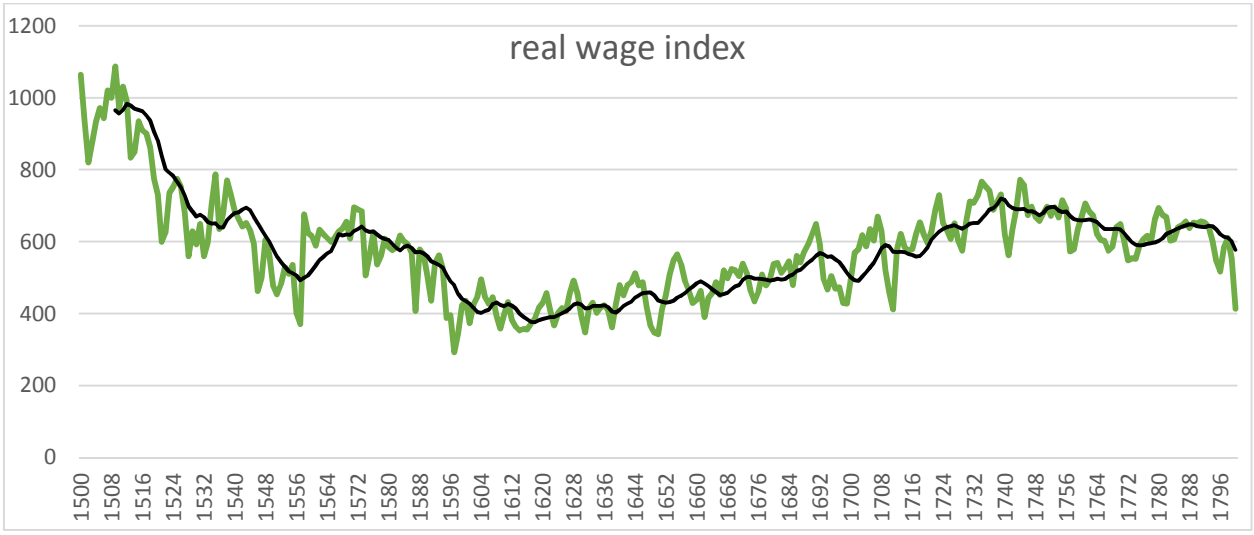


Figure 9. Real wage index. Black line - ten years moving average. Source: E. A. Wrigley, R.S. Schofield Table A9.2 pp. 642-644.

These indications allowed us to assume that in 1560s the English reservoir was filled due to very quick population growth in 1510s - 1550s. The mortality crisis of the 1550s was not accidental. The high critical coefficient caused fall in real wages, growth of rural unemployment and influx of hungry and homeless people in towns. The low level of development of population and consequently low level of hygiene made the following epidemic devastating.

The most interesting feature of the period is atypical trend of real wages i.e. their growth along with population growth. From the point of view of the proposed model, it may be accounted for that after the reservoir had been filled in 1550s, further population growth was possible only by intensification of land use and such intensification occurred. The necessity of intensification created interest to new agricultural methods. Scholars note that after about 1560 the methods were more carefully examined and discussed than at any time since thirteenth century[33], when, as we have seen, the previous filling of English reservoir had happened. According to the model of progress, the intensification of land use is a main driver of growth of level of development of population in conjunction with growth of standards of living. In other words if intensification of land use had happened then the real wages must grow.

The dynamics of real wages are evidence of the very important changes in English society. The high and further growing critical coefficient forced more and more people out from agriculture. The majority of redundant population looked for means of subsistence in trade and industry. Owning to abundant cheap labour in the second half of the sixteenth century all kind of industry grew especially quickly. Probably the most rapidly growing was coal-mining. Only in the 1550s coal was mined by peasants as a part-time activity. However, by the beginning of the seventeenth century in the coal industry worked thousands of full-time workers[34] and output of coal increased several times. Quickly growing in the second half of the sixteenth century was metallurgy - extracting and smelting of iron, copper and lead. For example, scholars noted that the most of the growth of lead production came in the last quarter of the century[35]. The increase in output of salt, glass, alum, soap, gunpowder, in construction of ships was enormous[36] The development of English economy in the last two decades of the sixteenth century and two first decades of the seventeenth century was so quick that J.U. Nef compared it with the beginning of Industrial revolution in the second half of the eighteenth century[37].

[33] J. Thirsk (1967b), p. 161
[34] J.U. Nef (2013), pp. 135-136.
[35] P. Williams (1995), p.191.
[36] J.U. Nef (1958), p. 8.
[37] *Ibid.* p. 8.

The increased share of people engaged in non-agricultural labour activity, which is more complex that the agricultural labour, raised the level of development of England's population else more besides the intensification of agriculture, that caused extra growth of the level of necessities that added to the rise of real wages.

As a result of abundant supply of cheap labour, English oversea trade was on the rise in the second half of the sixteen century. Many landless peasant's sons in the time were ready for dangerous life of seaman. Therefore, English fleet developed very quickly that made possible the victory of England in war with Spain in 1585-1605. English merchants excluded foreign merchants from English overseas trade. It is not accident that the beginning of many trade chartered companies (except for the old Staple and Merchant Adventurers companies) occurred in the second half of the sixteenth century: Muscovy company in 1553, African company in 1554, Spanish company in 1577, Eastland company in 1579, Levant company in 1581, Morocco company in 1588, East India company in 1600. It is of importance to note that these companies were long oversea trade companies in contrast to Staplers and Merchant Adventurers who exported English wool production to the nearest continental countries.

However, part of the redundant population became vagabonds and criminals therefore government had to take measures to control the situations. In the first half of the sixteenth century the measures were punitive only because society considered the vagabonds were idlers. From the middle of the century, the public opinion changed and in 1563 Elizabeth passed "Act for the relief of the poor" which required to collect money for poor and even provided punishment for refusal to contribute. Again, the important changes in English society occurred from the middle of the sixteenth century.

As a result of quickly growing of the level of development, more people were going to the universities, the printing production grew quickly. As scholars assert, in the second half of the sixteenth century the number of "petty schools" and grammar schools increased substantially. Overall 136 new grammar schools are known to have been founded between 1558 and 1603[38].

The striking illustration of the grown level of development of Englishmen in the second half of the sixteenth century was golden age of English culture[39]. It was time of the flowering of literature in drama and poetry, music and architecture. The works of William Shakespeare, Christopher Marlowe and Ben Jonson are the outstanding legacy of the period. Certainly, it is not accidental that such brilliant personalities worked exactly in this time.

Very interesting feature of the sixteenth century was English reformation. When Henry VIII began reformation in 1532 it was reformation from above. The reformation from above was made by authority for ends of the authority, as it was, for example, in the North Germany, where in contrast to the South Germany, the critical coefficient was low. The reformation from below was a result of seeking and striving of the broad masses of population under action of high critical coefficient, as I have noted above. In this case the reformation was a revolutionary ideology that was well-known to Henry VIII. Therefore he did not wonted the reformation from below and all reforms of English church in 1529-1539 were political not theological[40] to the extent that was advantageous for the king. Further history of English reformation was a gradually transition to the reformation from below to follow the growing critical coefficient. In the first stages of the process, English population was mostly indifferent to the reformation while backward regions were against it as it was during the Pilgrimage of Grace.

In time of Edward IV further progress of reformation was not popular except for London and the South-east but even there it was a minority faith. The unpopularity of reformation made it possible for Mary to suppress easily the attempt to elevate to the throne the protestant Lady Grey and to repeal the reformation legislation. Though 283 Protestants were burned, there was not a mass resistance[41]. Elisabeth returned to her father's religious politic of limited reformation

[38] P. Williams (1995), p. 392.
[39] C. Hibbert (1991).
[40] E. H. Shagan (2003), p. 29.
[41] S. Doran, C. Durston (2003), p. 118.

from above. But situation changed since the beginning of 1560s because filling of reservoir caused the growth of social tension in English society therefore organized puritan movement in English Church is traceable from that time[42]. Scholars note dissemination of radical protestant ideas from 1570 onward[43]. Since the middle of the 1580s the Puritan movement had received a powerful backing from the broad masses of the population. Members of the Commons in this time claimed that the Church is subject to Parliament and petitioned of the Lords to allow the ministers to change of some portions of the Prayer Book for deepening of reformation[44]. Further, the religious radicalism of the masses was growing else more and we again must to note that turning point was the beginning of the second half of the sixteenth century.

In the 1590s the high and further growing critical coefficient was aggravated by four successive harvest failures – in 1594, 1595, 1596, and 1597. Was it an accident that four years running weather was so bad to raise wheat prices in two and a half times in comparison with the beginning of the decade? If we take into account that just from that time the steep decline of real wages had begun, which reached the lowest point for whole period, as we can see on the figure 8, perhaps not. On the contrary, to the lowest critical coefficient of the period 1445-1480, in time of the very high critical coefficient English agriculture could not produce any grain reserves and weather uncertainty caused steep rise in prices, famine and starvation. In this period the marriage and the birth rates diminished while death rates rose, though not so steeply as in 1558, owning to absence of epidemic.

The cause for the deepest fall in real wages in the end of the sixteen – beginning of the seventeenth centuries was exhaustion of possibilities for intensification of agriculture in the given economic and social conditions while the population continued to grow. These possibilities were limited by unwillingness of English peasants to put into practise new more intensive methods of land use because fall of labour productivity. Therefore intensification in the sixteenth century occurred mostly by conversion of pasture to arable because this way of intensification caused much less decrease in labour productivity than, for example fodder crop growing. In the sixteenth century's England, after depopulation of the previous century, reserves for further intensification were considerable. In regions with lower critical coefficient the most intensification of land use occurred by conversion of deer parks, woodlands and waste to pasture. Scholars note conversion of many parks to arable or pasture[45] in the second half of the century. In many stock-farming regions the intensification was going on by transition to dairying[46]. However, the bulk of arable was cultivated under old two-field and three-field rotation systems. In places with low critical coefficient such extensive systems as long fallow[47] or even forest-wallow survived[48]. New more intensive methods were a rare exception because they caused deep fall in the labour productivity. Therefore, peasants put them off as long as was possible. For example, quick developing of the market-gardening had begun only in the 1590s[49].The drainage of fens only began in the second half of the sixteenth century but was carried out on a much larger scale in the seventeenth [50]. One may say the same about industrial crops which were very labour intensive. Such crops as woad for dyeing cloth, tobacco and rape were introduced towards the end of the sixteenth century[51]. Besides in England one of the most intensive branches of agriculture – vine growing and wine making is impossible due to natural conditions.

The important result of the unwillingness of peasantry to apply more intensive methods of agriculture was scarcity of grazing ground. The growing population made it necessary to till

[42] N. Tyacke (2001), p. 61.
[43] S. Doran, C. Durston (2003), pp. 126-127.
[44] *Ibid,* p. 63.
[45] P. Williams (1995), p. 9.
[46] J. Thirsk (1967a), pp. 30, 69, 86, 48.
[47] *Ibid,* p. 100.
[48] *Ibid,* 76.
[49] J. Thirsk (1967b), p. 196
[50] P. Williams (1995), p. 205.
[51] *Ibid,* pp. 194-195.

more land for grain growing. Until here was enough waste it did note caused many problems. But as wasteland had been all used further increase of arable was possible only at the expense of pasture. The matter was ratio of arable to pasture. If pasture was too small peasantry could not keep drought animals and obtain enough manure that was of especial importance because it was only method of maintaining land productivity. The conversion of pasture to arable threatened to upset the balance. The problem of scarcity of pasture was well known for all in the English society. In 1621 a speaker in the House of Commons said that "there is not want of corn land at this time but want of pastures and cattle for much woodlands and barren ground are become fruitful cornland instead of pasture"[52]. The only possible way out of the situation was growing of fodder crop instead of fallows. In such way the English agriculture intensified later but it caused considerable fall of labour productivity. In the sixteenth century English peasantry was not ready for it.

In this way the peasant's unwillingness to transit to more intensive land use manifested itself in resistance to enclosure. In juridical terms enclosure was changing a legal status of land from common rights to private ownership. From economical point of view the enclosure made intensification of land use possible. Common rights and the system of open fields prevented the intensification while growing critical coefficient demanded it. Thus, the opposition of peasantry to enclosure prevented further development of the country. As a rule in every commune there were people who wanted intensification of agriculture but majority of peasants did not. However, under system of open fields it was impossible for an individual to put into practise intensive methods of agriculture.

In pasture regions nature limited the possibility of conversion of arable to pasture because many soils were unfit for tillage and corn growing. In such regions under plough there was 30 per cent and less of all used lands, while in lowland regions the figure was 60 to 80 per cent[53]. In Midlands there were townships where under plough were 90 per cent of all land[54]. In this case the common right of pasture in fallow and after harvest was of great importance for the peasantry. Therefore, as scholars noted, in champion regions the difficulties attending enclosure were much greater than in the pastoral[55]. Thus, maximal resistance the enclosures met where there the possibilities for increasing of arable were maximal – in east Midlands[56].

Besides, in pastoral regions the human capacity was much less than in champion ones. Therefore, according to the second law of reservoir, development here occurred quicker and even in lowland districts of such region by the seventeenth century many common fields were enclosed by mutual agreement[57]. The high critical coefficient forced peasants to intensify agriculture that was possible, with rare exclusions, only by enclosures and abolishment of common rights to land.

Nearly half of English land was enclosed in the fifteenth century. Wordie argued that it was about 45 per cent of total area of England while in the sixteenth century it was only 2 per cent[58]. His conclusions were criticized[59] but do not speak about the precise figures the ratio of volumes of enclosed land is consistent with all above mentioned facts. The deepest population decline in the fifteenth century *must* cause the extensification of land use that in England of these times led to the transition of arable to pasture. Such transition was possible only if common rights and open field system were abolished and land was enclosed because the common rights fixed the level of achieved intensification. Tomas More, as well as many others, was wrong when thought that sheep devoured men. Here the cause and consequence are confused.

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[52] J. Thirsk (1967c), p. 213.
[53] J. Thirsk (1967a), p. 30.
[54] D. Hall (2014), p. 5.
[55] J. Thirsk (1967a), p. 101.
[56] *Ibid,* p. 102.
[57] *Ibid,* pp. 28-29, 50, 62, 73.
[58] J. R. Wordie (1983), table 7, p. 502.
[59] For example J. Chapmen (1984), p. 557-559.

Enclosures in the fifteenth century were a result of depopulation not cause. If we take into account the scale of the fifteenth century's depopulation then possibility of the enclosure of near a half of all lands is quite possible.

These enclosures were made without any protests because the critical coefficient was very low. The growth of population changed the situation in essence. As we have noted above, the price dynamics show clear tendency of population growth from the 1510s onward. It is no wonder that scholars asserted that from the 1520s the rising population had begun to express its resentment at the conversion of the arable to pasture in the course of enclosures[60]. Society was sure that enclosures caused depopulation and government did its best to prevent enclosures especially in times of famines and increase of number of vagabonds. Thus, only two per cent of enclosed land in the sixteenth century is possible. Certainly, it strongly limited the possibilities for further intensification.

However, the intensification of agriculture on enclosed lands by the end of the sixteenth century showed that it was beneficial and did not cause depopulation therefore government abolished the tillage acts in 1593. But it was time of last filling of English reservoir therefore the period of famines and the deepest fall in real wages. The peasantry demanded the renewing of the ban on enclosures and government had to do it in order to quiet lower strata. Nevertheless from that time the government had changed attitude to enclosures and after 1607, when the last large scale enclosure commission was created, the fines for enclosure had become a revenue-raising device[61]. The intensification of agriculture on the enclosed lands allowed to make greater returns therefore price of enclosed land was higher. It is interesting that in the very beginning of the seventeenth century John Norden reckoned that enclosed land was worth one and a half times the value of unenclosed[62] while Henry Best, writing in 1641thought that enclosed land was worth thrice the value of common land[63]. Perhaps, it was a result of development of intensification during the first four decades of the seventeenth century.

Intensification of agriculture changed social structure of agriculturists. Instead of only peasant communities, practising subsistent husbandry, class of farmers had come into existence. I think it is possible to distinguish between *peasantry* who practise subsistent agriculture and *farmers* who work for market. The labour of a farmer differs from the labour of a peasant essentially: the former have to consider market conjuncture the latter works by tradition. The former wants more profit the latter wants only to survive without many efforts. It is different complexity of labour consequently different level of development. The more share of farmers in preindustrial country's population the higher the level of development of the whole country. During the sixteenth century, the share was growing steadily. The peasants could not withstand competition with the farmers in a society where market was of significance. Peasant husbandry has not reserves, after two or three divisions between heirs their plots become too small to provide subsistence, they fall into debts and ultimately have to sell their plots. Thus, the land concentrated in the hands of farmers.

The redundant population could only migrate to towns or in regions with low critical coefficient. In England such regions were forests, where soils were unsuitable for arable. In such way following pattern came into existence: champion regions with good soils lost redundant population and remained agricultural. Woodland regions accepted migrants, there intensive dairy farming was growing and many industries developed. However, the development of industries was limited by low level of necessities of mostly peasant population therefore low demand for industrial goods. Besides English goods could not withstand competition in international markets owning to low quality. The wool export trade showed no growth from 1550 while before the revolution woollen cloth still accounted for 90 per cent of the whole export. Thus, the development of England was limited, while population continued to grow. As a result the

[60] I. Blanchard (1970).
[61] J. Thirsk (1967c), p. 213.
[62] P. Williams (1995), p. 192.
[63] H. Best (1857), p. 130.

standards of living from the end of the sixteenth century fell near to biological limit that marked the last filling of English reservoir, therefore the first forty years of the seventeenth century was time when despair and hatred was accumulating in English society that in 1642 would erupt in the revolution.

English revolution is very interesting phenomenon of development of the country. It uncovered deep social processes in different social strata and regions. From the point of view of the proposed model all England's territory may be divided, with many reservations, in three large regions: North, South-west and South-east. From them the North has the smallest capacity. Under plough there was 30 per cent and less due to natural conditions[64]. Thus, the majority of population was engaged in pasture farming. A as a consequence, according to the proposed model, the level of development of the population was low in comparison with population engaged in more complex labour activity. It is interesting that contemporaries knew that very well. For example, Norden noted, "the people bred amongst woods are naturally more stubborn and uncivil than in the champion countries"[65]. In the North, as contemporaries thought, lived professed Papists, thieves, and atheists living without fear of God or regard of any wholesome laws. The whole region was for them a wild savage country, its inhabitants primitive in their passions and morals, and entirely without understanding of the rules of a low-abiding society[66]. As a result of the lowest level of development, the standards of living in the North were the lowest in England and the northern counties were the poorest. As elsewhere in the North the redundant population was engaged in industry but, as a whole, its production was of low quality owning to low level of development of the population.

Because the capacity of reservoirs there were small and further intensification of agriculture was impossible, the North very early had transited to stationary state and achieved level of development was fixed, while other England regions continued to develop. Therefore, the North was a stronghold of conservatism; it supported Catholicism in time of Henry VIII's reformation and the king during the Civil Wars.

In the South-west region as well as in the North the most of land was used as pasture, but share of arable land there was considerably bigger. Owning to these natural conditions population density there was higher, especially in Somerset, which was the third most densely populated county in England[67]. In western Somerset, the agriculture was intensive. In the eastern woodland Somerset many industries developed: cloth-making, glove-making, stocking-knitting, mining of coal, iron, lead, zinc, stone[68]. However, in the South-west there were Cornwall and Devonshire with very extensive land use consequently the ones of the poorest counties in England. Owning to higher population density and more intensive agriculture, the industries in the South-west were more developed with production of higher quality than in the North. In the seventeenth century from Exeter, which was a centre of fine kerseys making, near one third of all English cloth was exported[69]. As a result, the level of development of population there was higher than in the North. It is interesting to note, that in both regions rebellions were often phenomena that is reliable evidence of very high critical coefficient. But by the seventeenth century, the South-west region was in the stationary state. Therefore, it was as well as the North a stronghold of royalists. Nevertheless there were industrial regions into which the redundant population migrated therefore they had higher level of development and sided with parliament as, for example, Somerset, which was always on the far left[70].

The South-east had the biggest capacity of all English regions. It was even more inhomogeneous in conditions for development than the South-west. The three sub-regions were

[64] J. Thirsk (1967a), p. 30.
[65] J. Norden p. 169.
[66] J. Thirsk (1967a), p. 16-17.
[67] J. Thirsk (1967a), p. 72.
[68] *Ibid,* p. 72.
[69] Seventeenth-century economic documents. p 324.
[70] H.N. Brailsford (1961). p. 355.

of the main importance – London and the home counties is a first one. The main importance of London for England, in addition that it was a capital, was its scale of elite trade. London was far largest England's and one of European major centres of elite trade. It is revealing that in the seventeenth century the port of London, shipping and ancillary trade, might have employed of one quarter of capital's working force[71]. The main items by value of the port's commodity turnover were the elite goods. Besides many London industries processed imported raw materials or manufactured for export[72] the elite goods. The flow of money from the elite trade as well as money of king's court and courtiers created in London the largest in England demand for elite goods for own consumption. As a result of complex labour for production of the goods, the level of development of these London's population strata, who were engaged in it, was well above the country average.

However, London was the largest in England destination for migrants. The stream of landless peasants, who had the lowest in the country level of development never stopped. We know that death rates in London regularly exceeded the birth rates until around 1802. Nevertheless, between 1550 and 1750 London was growing faster than the population of England[73] that is an evidence of the scale of immigration. Not all these people were illiterate peasant sons but surely the majority was. Thus from one hand London was an intellectual center of the country, its population had the highest level of development and, correspondently high incomes. From another hand in London lived many poor people with very low level of development. Therefore, during the revolution the stand of London's citizen was ambivalent; sometimes radical, sometimes conservative. Home counties and for some extent Kent and Surrey were under ascendancy of London. These counties supplied London's market with agricultural production. The redundant population migrated from there to London, therefore there large domestic industry did not come into existence[74], except for Weald.

The second sub-region of the South-east was East Midlands. It had the maximal critical population density in England and by the revolution the critical coefficient there was below 1. Therefore, East Midlands did not sided definitely with the king or the parliament. As always it happens, according to the third law of reservoir, when critical coefficient is low the population is passive.

Finally, the third sub-region was East Anglia and adjusting territories: eastern Lincolnshire, eastern Cambridgeshire and most of Essex. Some parts of the land were highly fertile while others were very poor. Climate of East Anglia is very favourable for agriculture: long duration of sunshine and the most rainfall in summer months[75]. These natural conditions made intensive agriculture possible, while relatively small capacity of reservoirs made it necessary. Therefore, by the revolution the agriculture of the sub-region was most intensive in England. For example, Norfolk and Suffolk were among the first English counties to grow hops. Suffolk specialized in hemp-growing. The farmers of East Anglia in the sixteenth century had by far numerous and the widest range of vehicles and arable tools of any part of England[76]. The redundant population early was involved in industries, especially in cloth industry. In 1630 half the adult population of Essex was employed in the cloth trade and luxurious "Suffolk shortcloths" were well-known in Western world. Thus, the sub-region was the most densely settled and high-urbanised part of England and Norwich was the second England's largest city[77]. As a result of complex labour activity population of the sub-region by the revolution had the highest level of development in England except for London. Besides, this sub-region was highly influenced by the Netherlands, the most developed country of that time.

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[71] J. Boulton (2000), pp. 320-323.
[72] *Ibid.*
[73] E. A. Wrigley, R.S. Schofield (1997), p. 166.
[74] J. Thirsk (1967a), p. 52.
[75] P.M. Roxby (1928), p. 157.
[76] J. Thirsk (1967a), p. 43.
[77] D.H. Fisher (1989), p. 43.

East Anglia by the revolution had very high critical coefficient (may be the highest in England), because of small capacity of the reservoir and crisis in the cloth trade in the first half of the seventeenth century. Therefore, the Puritanism was especially strong here. William Loud thought that East Anglia was a throbbing heart of heresy in England[78]. All these facts allowed us to understand the active role of East Anglia in antiroyalist struggle in the Civil wars.

From my point of view the best analyse of causes of the English revolution is one of Jack Goldstone[79]. He showed brilliantly how population growth under high critical coefficient (absence of land reserves) caused dispossession of land of peasantry[80]; that growth of critical coefficient and following growth of prices made it impossible for the Crown to carry out its main duties[81] and how the fiscal crisis and attempts of the king to balance budget caused elite opposition to the king[82].

Goldstone's answer for the question – was the English revolution inevitable is negative[83] because for him demographic crisis of the seventeenth century was the same as, for example, the crisis of the fourteenth century. Certainly, in the 1380s the situation was similar but the Great Peasant's revolt was not a revolution because it was phenomenon of smaller scale in both social and geographical dimensions. The conception of last filling of reservoir allows us to understand the main cause of timing of the revolution. According to it, a revolution would happen when all possibilities for further intensification are exhausted in existent economic and social conditions. We may conclude from the demographical dynamics and trend in real wages that English revolution was inevitable and it must happen in the time when it had really happened.

That English reservoir was filled last time in the first half of the seventeenth century may be assumed among others facts with dynamic of emigration from England. People do not leave their motherland if only forced by extremely poverty and discomfort both caused by unbearably high critical coefficient. Wrigley and Schofield proved that rates of net emigration during period of 1640-1670 were the highest in English history. For the sixty years (1620-1680) about a half of million (10 per cent of total population) had left England for good[84]. The Elizabethan government formed elaborate schemes in the 1580s to colonize Ireland in order to create English bulwarks in the rebellious island but few Englishmen were willing to settle here[85]. In this same time, English colony established at Roanoke Island in America in the 1580s had disappeared without trace by 1590. The political aims of the colonisation were evident, but there were not enough people ready for emigration.

The situation changed in the beginning of the seventeenth century with plantation of Ulster. Small plantation began in 1606 but official large plantation began in 1609. By 1622 the number of English adult male migrants in Ulster was about 3100[86] that returns of whole English migrant population 10-15 thousands. Practically at the same time, in 1607, successful foundation of the Virginia colony happened. It is interesting to note that before the revolution East Anglia's inhabitants were the most England's numerous emigrants to America[87] that corroborate the thesis of the highest critical coefficient in East Anglia. Later the emigration from England only became larger. Was it a coincidence that just in this time the real wages fell to biological limit, to stay at this level until the revolution had begun? Thus, all above mentioned facts fairly correspond to conception of the last filling of reservoir.

In the theoretical part I have briefly outlined development of a revolution process. English society developed in the sixteenth century in accordance with the theory. Quick growth

[78] W. Hunt (1983), x.
[79] J. Goldstone (1991).
[80] *Ibid,* pp.72-74.
[81] *Ibid,* pp. 94-98.
[82] *Ibid,* pp. 99-101.
[83] *Ibid,* p. 156.
[84] E. A. Wrigley, R.S. Schofield (1997), p. 219, table 7.11.
[85] P. Williams (1995), p. 29.
[86] N. Canny (2003), p. 211.
[87] D.H. Fisher (1996) p. 13 fl.

of critical coefficient made English economy prosperous, as a result of more and more complex labour English culture developed quickly, the power of monarch was absolute or near to absolute. However, the last filling of the reservoir in the beginning of the seventeenth century changed the situation in essence. Wages fell to biological limit, social tensions were the strongest, religious controversies were bitter, radical religious sects after 1630 spread especially quickly, state budget was unbalanced, the elite of society was in opposition to the king.

In the conflict on the top of society two tendencies manifested themselves: first, it was desire of elite to use social resentment for changing balance of power for its advantage; second it was beginning of long-term tendency of limitation of the king's power. This tendency was a consequence of growing level of development of population. According to the theory of progress, there is correspondence of state power with achieved level of development and critical coefficient. As a result of the quick development of English society during the sixteenth century, the tendency to limit the power of monarch for the first time revealed itself in the monopoly debates of the last two Elizabethan Parliaments[88]. The monopoly hindered the development of trade and industry and the parliament had well-founded reasons to correct government's policy. However, for Elisabeth it was encroachment on her prerogatives. It is significant that the queen overcame easily. During next four decades the tendency, though much stronger, was completely submitted to political struggle for the redistribution of power as the critical coefficient had made social tensions in England maximal.

English revolution had some very important features. The main cause of the specific character of English revolution was importance of cavalry on battlefields which was far most important than infantry because low effectiveness of smooth-bore firearms of the time. The most numerous of all cavalrymen were cuirassiers, who were drawn from the nobility and the lesser landowners[89]. It was needed to have considerable income to buy a battle horse, arms, equipment and have enough spare-time to have training. Thus, the main military force of the seventeenth century was nobility. The low social stratum was powerless as a military force without noble cavalry as clubmen movement showed, which never was a serious problem for both sides of the Civil Wars. Therefore, the low social strata never had political ambitions in English revolution and it was useless for politics to appeal to them. This is a main difference of English revolution with other revolutions, which happened later.

This thesis allowed to understand the development of English revolutionary process. On the first stage of the revolution, the broad masses of the South-east were very active in support of the parliament. The citizens of London forced the House of Lords and the king to execute Stafford and Laud. They protected the five accused members of the parliament with arms in their hands. In summer of 1642 there were unprecedented attacks on noble's and gentry's households, who were Catholics or supporters of the king, spread out into the counties of Essex and Suffolk[90]. This stand of broad masses of the population drew the king from the South-east to the North, where, as it was stated above, the public mood was conservative and therefore pro-royalist. As the revolutionary process could not go down, the officers in both sides of the Civil War were nobles. The Long Parliament was of high social ranks as well as another side of conflict. It was a war on top of society, a war for redistribution of power.

In the first Civil War many people took arms voluntarily on both sides but by the end of the war population had tired and disenchanted with the revolution. It is no wonder, because they wanted better life, while during the revolution life had become much worse. In order to win the war the parliament needed to deepen the revolution and apply the lower and more radical social stratum. So it happened. The New Model Army was an army of low middle class. The main force, cavalry, could not be proletarians for they provided their own horses, saddles and arms. Only horse fit for cavalry cost in these days more than any journeyman could earn in a year[91].

[88] P. Williams (1995), p. 140.
[89] M. Wanklyn, F. Jones (2005), p. 30.
[90] Walter (1999), p. 1-2.
[91] H. N. Brailsford (1961), p. 149.

Most of Cromwell's troopers were yeomen and yeomen's sons[92] and many were from East Anglia where the critical coefficient was especially high that determine the radicalism of the New Model.

But the most important thing that Cromwell had done to do the Army even more radical, it was promotion of "plain, russet-coated" men, as he wrote in letter to Sir William Spring in 1643, to be officers of the Army. It was impossible in any army of the time. Such thing occurred only in the Hussite armies[93] and in both cases it was a result of deepening of revolution process. No wonder that such army could do miracles on battlefields.

After the end of the First Civil War, English population was tired enough with anarchy therefore according to the proposed theory, the only way for further development was centralization of power. However, in England two centers of authority had come into existence: the Long Parliament and the New Model Army. The former was of high social class therefore more conservative. The parliamentarians kept the King as a captive and was sure to come to terms with him for the redistribution of power. They did not want deepening of revolution process by no means. Therefore, they made all possible to remove the New Model from political scene. They attempted to disband it, to send it in Ireland. However the New Model, the top officers and the ranks, all of them understood well that the Parliament want to rob them of deserved victory while the Army was superior military force in Britain isles.

From that point, the political struggle between the New Model Army and Parliament had begun. The King was removed from the custody of Parliament and was placed under control of the Army. On 8 June 1647, General Fairfax sent the Army's demands (Solemn Engagement) to Parliament along with a letter explaining that the King was now in the custody of the Army. It was a challenge and ultimatum simultaneously.

Further followed radicalization of the revolution. As usually it happened, the leaders of the army were more conservative. The lower service men had to urge them on. Nevertheless, the lower strata could not do without leaders and such leaders came into existence. It were Levellers. Their historic function was to organize and to raise the lower service men for compulsion of the top army officers for further radicalization.

Was it possible that the Levellers could replace the top officers as leaders of the New Model? I am sure it was not. The Levellers were "the middle sort of people" as Lilburn described them[94] and majority of them were from London. It presupposed high level of development. Therefore, the Levellers were first English political movement framing democratic ideas, which were of quite modern sort. But the Levellers passed ahead of their time. In the seventeenth century, the level of development of English society was too low to realize the Levellers' program. The soldiers' main concerns were their own grievances: arrears of payment for the Army, a full indemnity for actions during the Civil War, provision for maimed soldiers, widows and orphans. The Levellers' ideas must seemed to the soldiers as something abstract and far away from real needs. Certainly, some soldiers were ready to take in such ideas but not majority.

The Levellers leaders as experienced politics understood well what kind of slogans might raise the soldiers. However, these slogans (arrears, indemnity and so on) were not radical and were quite admissible for the top officers of the New Model. In this case, the Levellers had lost quickly their advantage over the generals as Army's leaders, while the generals who led the Army from victory to victory never lost that of their.

The fact that the New Model was a lowest point to which radicalization of English revolution was possible, made it impossible for the Levellers to use as a revolutionary slogan agrarian reform though abolishing of base tenures and conversion it into freehold was mentioned[95]. However, this slogan might be of interest only for peasantry but peasants, as was stated above, were useless in these times as a military force consequently as politic one. The

[92] *Ibid,* p. 145.
[93] H.N. Brailsford (1961), p. 157.
[94] *Ibid,* p. 314.
[95] *Ibid,* p. 328-330.

Levellers idea of manhood suffrage was of same kind. The extension of suffrage would make for Levellers possible to radicalize the revolution but there was not a force, which could do it.

The period of 1647-1649 was a culmination, a turning point of English revolution. By 1647 the war, revolution anarchy and confiscation of royalists' estates resulted in economic decline. The harvest failures in 1647 -1649 raised prices that caused fall in real wages to the second lowest point after 1597 as we can see on figure 8. Certainly, it intensified political struggle. There were mutinies in some counties. No wonder that the Leveller party as a political organization had come into being in the winter months of 1647[96].

However, the beginning of the Second Civil War delayed upshot of the political struggle. Nevertheless, the social tension in England was only growing. Authors maintain that the second Civil War was fought with a brutality to which in the First War the Parliament's armies rarely descended[97]. For example, thousands of captives were sold to serve as slaves in plantations. Therefore, after the war ended the events were moving quickly. On 6 December 1648, after the Commons resolved, despite intensive army pressure, to continue negotiation with the king[98], the Army took the parliament under its control. On 30 January 1649 Charles I was executed; 17 March, the Rump Parliament formally passed an Act abolishing the kingship and 19 May 1649 the Rump adopted "An Act declaring England to be a Commonwealth".

Formally, England had become a republic. In reality, it was the Army's dictatorship, headed by Cromwell. According to the proposed theory, a republic after a peasant's revolution is possible by no means. Democracy is "rule of the people" but the level of development of the mostly peasant population of England was too low to rule the country. Cromwell argued that manhood suffrage meant anarchy[99] and he knew that he said. In the countries with low level of development of population, who can influence government, the government will constantly fluctuate from anarchy to despotism and back again. The despotism, arbitrary administration is bad but all endeavors to change the mode of authority lead to anarchy because people cannot organize their life due to low level of development. The striking examples are Libya and Iraq after toppling of dictatorial regimes. When people tired from anarchy, they preferred dictatorship again as in today Russia after chaos of 1990s.

There was enough anarchy in England during the First and Seconds Civil Wars: armies of the king as well as the parliament had often been driven to help themselves to food, quarter, horses and money. The number of unpaid disbanded soldiers who roamed the country was growing[100], the sufferings of starving bottoms caused fears of well-to-do gentry of popular riots, that all together increasing the desire of many people for law and order for any cost. Therefore, the Cromwell's Protectorate was inevitable result of the revolutionary process. As William Walwyn wrote about situation in England before the army's dictatorship: "To be short, all the quarrel we have at this day in the kingdom is no other than a quarrel of interest and parties, a pulling down of one tyrant to set up another, and instead of liberty, heaping upon ourselves a greater slavery than we fought against"[101]. If not Cromwell then somebody else would be a dictator, the matter was only how good he was for the role.

Cromwell was good. After his victories, the soldiers fully trusted him. Besides after his victories he was sure that God made him an instrument of God's will owning to that Cromwell was firmly self-confident when he thought he knows that God wants. This self-confidence allowed him unhesitatingly to dissolve or purge parliaments if they tried to limit Cromwell's power[102]. Notwithstanding that by the Second Civil War not only the upper social strata, but the

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[96] *Ibid,* p. 312.
[97] *Ibid,* p. 333.
[98] J. Miller (2006), p. 110.
[99] *Ibid,* p. 290.
[100] A. Woolrych (1983), p. 3-4
[101] H.N. Brailsford (1961), p. 343.
[102] B. Coward (2002), p. 44.

majority of English population had become pro-royalist[103], the Army headed by Cromwell easily controlled three kingdoms. During the Protectorate period, order was restored, economic situation somewhat improved, the tax burden on population was considerably lightened. The size of the army in England was reduced from 47000 men in March 1647 to around 14 000 men ten years later, therefore the assessment was cut from a peak £120 000 per month to £30000 per month[104]. England had begun struggle with the Netherlands for hegemony in elite trade and the creation of colonial empire.

All was good until Cromwell was alive. After his death, the situation changed in the main. No one from the army's generals could compete with Cromwell for power, (may be except only for Fairfax) but after he had gone, the generals' ambitions revived. It is interesting that English society accepted the succession of Richard Cromwell with signs of positive relief[105]. The majority of population did not want a republic or restoration of Stuarts, they wanted order.

However, generals of army wanted power for themselves. If there was a second Oliver Cromwell who had unanimous support of the soldiers, the restoration scarcely happened. But there was not such a person and New Model Army was divided for the first time in its history. After the generals forced Richard Cromwell to resign, anarchy and even possible war between army's groups loomed that frightened the Englishmen. Many remembered chaos during the Civil Wars and did not want it to return. The idea of restoration of the Stuarts was perceived by society as only way out of the situation. Monk sensed this public mood and made up his mind do not take part in the struggle for power but to assist the restoration of Charles II. It was correct decision because he had few chances in the power struggle while public support for restoration made his position in effecting the restoration of the monarchy without risk of loss. Army was invincible only until it was indivisible.

The period after death of Cromwell had a very important feature. The figure 4 shows to us that population trend after 1657 turned downward. Certainly, the accurate date may be of some degree of vagueness and we cannot demand too much from the historical demographers. Nevertheless, for the first time since end of the fifteenth century English population had begun to diminish. As we can see on figure 5, the rates of natural increase since 1655 fell steeply from 6-7 ‰ to zero and sometimes to negative values. The death rates had begun to increase from 1657 (Fig. 4), however the birth rates had begun to fall quickly since mid of 1640s and reached the lowest values during all period in question in 1659 (Fig. 7). Hence, though historical demographers think that fertility and mortality contributed equally to the steady fall in rates of population increase in the seventeenth century[106], the fall of the fertility rates preceded that of mortality rates. Thus, the diminishing of English population after 1656 was an accommodation of population size to capacity of English reservoir, which was inevitable phenomenon in all preindustrial societies. However interesting is the way in which the accommodation had happened. Though both checks on population were operating in England, as well as in many countries of Europe, the preventive check (diminishing of fertility) contributed about the half of population decline, while, for example in France, the contribution of positive check (rise of mortality) to such accommodations was much larger[107]. It testifies that the level of development in England was considerably higher.

According to the model of progress, the diminishing of the critical coefficient caused decrease of all kinds of activity of population. So it happened. Scholars write about the general economic depression in 1658[108]. Trend of food prices turned downward even earlier and Protectorate parliament reversed the policy that prevailed for a century permitting export of food

[103] H.N. Brailsford (1961), p. 336, 338.
[104] H. Reece (2013), p. 174.
[105] N.H. Keeble.(2008), p. 5.
[106] E. Wrigley and R.S. Schofield (1997), p. 244.
[107] P. Goubert, (1960), pp. 45-59.
[108] Chapters from agrarian history. v. 3. p. 153.

in 1656[109]. The last filling of English reservoir occurred mostly owning to opposition of peasantry to enclosures with following intensification. Though this opposition was overcoming before the revolution the process of intensification was going slower than the population growth that caused the beginning of revolution. After the revolution authorities did not prohibit enclosures and the intensification might came much quicker. As a result, plenty of food allowed food export. As it always happened when the critical coefficient is diminishing, the prices of land and rents were falling[110]. Social tension slackened. Scholars calculated that the number of civil litigations after 1660 had dropped by 62 per cent and social mobility declined sharply[111].

In politics, the broad masses had become less active that made the restoration without a hitch. Even religious radicals, with few exceptions, had avoided political activism[112] what strongly contrast with their behaviour in the beginning of the revolution. As a whole, the radical puritanism declined. The similarity with the decline of popularity of Wycliffe's teaching after the fall of the critical coefficient in the beginning of the fifteenth century is evident.

It is interesting to note that though Charles II was restored as a king by royalist parliament, the royalists were not prepared to enhance the king's power any more than as they thought was strictly necessary[113]. After post-revolutionary shocks, in accordance with the theory I propose, the dictatorship was inevitable. Nevertheless, as population was reassured that anarchy and civil war would not return, the mechanism of conformity of social organisation to the achieved level of development was set in motion. English kings to begin with James I could not understand that it was impossible for them to rule as the absolute monarchs of France or Spain because the level of development of Frenchmen and Spaniards was lower than that of Englishmen. English kings insisted on their divine right to rule unlimitedly but English society had too high level of development to tolerate absolute monarchy. Thus, the parliament forced Charles II to make peace with Dutch in 1674 and to make war on France in 1678. Besides, in domestic affairs parliament had an upper hand in some important questions.

Just this misunderstanding was a cause of Exclusion crisis and later the Glorious Revolution. The Catholicism of James Stuart irritated English Protestants but it was only pretext. English society connected Catholicism and Absolutism. As Sir Henry Capel said in the House of Commons on 27 April 1679 that from popery came the notion of a standing army and arbitrary power[114]. Not even all Tory wanted absolute power of a king.

James II tried to change balance of power in the country to advantage of himself and it was of greater importance than his religious preferences. James pursued police of religious toleration; he issued the Declaration of Indulgence; attempted to relax the Penal Laws. However, Anglicans were sure that aim of the king was not freedom of conscious but getting of political support of Catholics and Dissenters, for example the Irish people, to whom the king promised greater autonomy of Irish parliament[115]. They were afraid that it would strengthen the king's power. Further, the king managed to obtain from the English courts of the common law a ruling that allowed him to dispense with Acts of Parliament; he purged judges, those in offices under the crown, who were opposed the king's politics, created large standing army. English political elite considered all these king's actions as preparation for absolute rule of James II.

A consequence was conspiracy in army and negative attitude of the majority of population to the king. Nevertheless, the critical coefficient was low and the population was passive. Therefore not a people uprising but William of Orange's invasion of England toppled regime of James II. Neither army of the Prince of Orange nor James II's army enjoyed

[109] *Ibid,* p. 129.
[110] P.J. Bowden (1971), pp. 211,214.
[111] J. Goldstone (1991), pp. 116, 120-121.
[112] J. Miller (2006), p. 136.
[113] *Ibid,* p. 140.
[114] J.P. Kenyon (2000), p. 2.
[115] T. Harris (2006), p. 440.

significant support from the bulk of population[116]. The conspiracy in the king's army was not large, it affected the mostly senior officers[117] and number of deserters from James' army was small[118]. Nevertheless, the king sensed the general negative feeling to himself or this old soldier would not fled England having double numerical superiority of army.

Any society after peasant revolution differ from pre-revolution society though both remain pre-industrial. As was said above every peasant revolution doomed to failure because its main aim is unrealisable. It is always victory of high social strata over lower strata. The lower strata had seen that revolution leads to deteriorating of living conditions, sufferings, deaths, anarchy and so on. As a result, after the peasant revolution the lower strata are more disciplined and more dutiful to the higher strata. So far as the higher strata always have higher level of development, the post-revolution society always have higher level of development too even if the intensification of agriculture have not happened yet.

However, the fall in the number of population was not deep – about 8 percent from 1657 to 1686[119], and not long – thirty years, after 1686 English population had begun to grow again. As a result, industry and trade revived somewhat, wool prices, which fell sharply in 1650s and more dramatically still in 1680s, recovered substantially in 1690s[120]. English overseas trade lost much in the first half on the seventeenth century. In the 1580s more than 90 per cent of the cloth shipped through the Sound was English, by the middle of the century it was less than thirty per cent. The cause of the contraction was competition of Dutch in the top sector of the market and numerous local producers in the low cheapest sector[121]. The share of Dutch cloth in the Baltic traffic had grown from 10 per cent in the late of the sixteenth century to more than 50 per cent by the middle of the seventeenth century[122]. From 1660 onward situation changed in the main and English merchants increased sales at the expense of cheaper new draperies, while the dear fabrics were predominantly Dutch. Leiden cloth industry increased output until 1671 and there was a fundamental shift from lighter cheaper fabrics towards dear sort of ones[123].

Thus notwithstanding the diminishing of critical coefficient, English cloth industry could took up cheaper sector of the market in place of local mid-European producers. It was possible only because the mid-seventeenth century in Europe was time of deep population decline[124], which was much deeper than that of English or the Republics' of United Provinces, the two post-revolutionary countries with the highest in Europe level of development. It is interesting to note that in the first half of the seventeenth century the English new draperies did not sell on any scale in the North and central Europe because competition of cheaper production of local worsted industry[125] but after fall of population this competition diminished steeply. Analogically in Mediterranean in the second half of the seventeenth century, English and Dutch clothes completely ruined Italian woollen industry[126], because for Italy it was time of deep population decline.

In economy important changes after 1660s are evident. Structure of English oversea trade began to change. In the first half of the seventeenth century woollens prevailed absolutely in export, for example in 1640 the woollens consisted of about 92 per cent of all exports[127], and apart from the woollens England was largely dependent on imported manufactures. The cause is evident – about half of English lands are fit only to sheep pasture, consequently no matter how

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[116] J. Childs (1980), p. 139.
[117] *Ibid,*p. 140.
[118] *Ibid*, p. 188.
[119] E. A. Wrigley and R.S. Schofield (1997), Table A3.3 pp. 531-535.
[120] P.J. Bowden (1971), p. 220.
[121] C.J.A. Clay (1984), v. II. p. 144.
[122] *Ibid.*
[123] J. Israel (1998), p. 624.
[124] D.H. Fisher (1996), pp-91-102.
[125] C.J.A. Clay (1984), v. II. p.147.
[126] *Ibid,*. p. 151.
[127] *Ibid,* p. 144.

high is the critical coefficient these land would feed only sheep that would provide certain wool output. Besides cool and wet English climate would ensure high quality of the wool. Nowhere in Europe did such conditions exist. Thus for England in early Modern Times wool was that oil for some Arab countries today.

However, by the end of the seventeenth century the share of woollen cloth in English export diminished to about 69 percent, foodstuffs consisted 11 per cent (the most important were fish and grain), 8 per cent were raw materials, the share of other manufactures increased to 12 per cent[128]. Thus, the structure of export is evidence of duality of nature of English development after 1660: from one hand, England was a country after peasant revolution with population much more disciplined and social structure much stronger due to that manufactures had begun to develop quicker. From another hand the critical coefficient in England was below 1, therefore the share of foodstuffs and raw materials was considerable – about one fifth of all exports.

After 1707 we have to speak about Britain not England. Barry Coward thought that it is an intriguing historical problem to try to explain why the unification of England and Scotland occurred in 1707 though the proposals for the union were raised from time of James I many times but always they found little support from both sides[129]. From the point of view of the proposed model, the problem is much deeper that it seems. The matter not only the union but the differences of development of the all countries of the British Isles. Above I considered only development of England but now it is appropriate to say some words about England's neighbors.

According to the second law of reservoir, Scotland and Ireland as countries with smaller capacity than England must develop quicker but, evidently, it was not a case. The matter is not only the second law of reservoir but the first one as well. The location of the British Isles is such that the most capacious their part - the south-east of England - is the most accessible for migrants from the continent. Therefore, this part of the isles was populated firstly and following migrations created here the highest population density because Scotland and especially Ireland are easy to defend, thus local people could practice more extensive land use and remain more backward. As Ireland was more difficult of access than Scotland, its population practiced the most extensive land use and the country was the most backward.

However, the development of such reservoirs occurred nevertheless and in long enough span of time, they can overtake and even surpass the more accessible and more capacious reservoir because action of the second law continued. So it happened when Scotland in the second half of the eighteenth century had become one of leading countries of Enlightenment and Scottish farmers, gardeners, engineers and physician taught Englishmen much[130].

The processes of development were quicker in Scotland already in the seventeenth century therefore Scottish peasant revolution had begun in 1637. By the end of the century, Scottish population had exceeded critical density again therefore the last five years of the seventeenth century was time of famine and decline[131]. Many contemporaries believed that for Scotland only remedy for the deep economic crisis was the union with England[132]. In reality, the unification created larger reservoir hence more possibilities for progress and Scotland took advantage of that. Thus, it was the best time for unification. In Ireland, however, mass emigration prevented further development as it was, for example in Spain and Portugal.

The English population growth in the first half of the eighteenth century have one very important and interesting feature. The figure 4 shows to us that after 1685 the population growth lasted until 1727. Then there is evident though short decline. The rates of natural increase fell to second largest negative value during all period since 1541. They were larger only in 1558 (figure 5). As a whole on the figure 4 the period 1700-1750 is very similar to the period 1541-1600. I am sure it is no coincidence. In first case, as was stated above, English reservoir was filled, though

[128] *Ibid,* p. 144.
[129] B. Coward (2014), p. 430.
[130] G.M. Trevelyan (1946) pp. 450-462.
[131] *Ibid,* p. 433.
[132] *Ibid,*. p. 437.

not all possible reserves for the intensification were exhausted. By middle of 1720s English reservoir was filled again and as it was in 1550s big mortality crisis followed. As we can see on the figure 6, the period 1727-1742 was the third period with the highest mortality (the first one – 1556-1563, the second – 1657-1681)[133]. These mortality crises are result of exceeding critical population density.

It is interesting to note that number of people in 1727 - 5 480 000 was approximately the same as in 1657 – 5 284 000[134]. The increase was only 3,7 per cent. Consequently the human capacity of English reservoir in that time was about five and a half million. Since the filling of English reservoir in 1557 (number of people 3 153 000[135]) its capacity owning to intensification of land use increased by 70 per cent. This intensification resulted in steady growth of the real wages (figure 9). Wordie asserted that in the seventeenth century in England were enclosed 24 per cent of lands while in the eighteenth century – 13 per cent and scholars think that much of seventeenth century's enclosures took place after 1650[136]. That corresponds to quicker growth of the real wages from the mid-seventeenth century. Certainly, large addition to the increase of standard of living of English population was development of industry and trade after peasant revolution.

In the eighteenth century not all enclosures were made by the parliament after 1760 because from 1724 to the middle of the century parliament passed 86 enclosure acts[137]. Evidently, that intensification of agriculture in the first half of the eighteenth century was occurring because the export of foodstuff was growing. From the beginning of the eighteenth century to its middle the cost of grain export increased in 3,9 times[138]. Thus notwithstanding the critical coefficient below 1 the intensification occurred. It was possible owning to the large stratum of farmers among the agriculturist who unlike peasants aimed to larger profit. It was a feature of emerging industrial society. However, the growth of agricultural output exceeded the rate of population growth only from 1660 to 1740[139], because after that date population exceeded the critical level again.

The intensification of agriculture and development of industry in the first half of the eighteenth century resulted in further growth of the real wages. This growth continued until 1730s, when the trend changed and turned downward (figure 9). It corresponds to assertion that in the end of 1720s the English population exceeded critical level again. It is interesting that scholars note that England had not subsistence food crisis with mass starvation from 1650 to 1725. It had experienced minor crisis when cases of starvation were widespread only in the northwest[140], in the one of the poorest regions of the country in that time. Here is analogy to the period 1445-1480 when the low critical coefficient allowed peasantry to produce grain with such considerable reserves that bad harvest did not caused food deficit.

Thus, there was a subsistence crisis with high mortality in 1728-1729[141] and in 1730[142], that decreased English population by 4 per cent. During next ten years population again reached 5,5 million then next mortality crisis in 1741-42[143] followed.

According to the theory of progress, this long period of intensification of agriculture from the middle of the seventeenth century to 1730s and development of industry and trade must result in growth of level of development of population. Indeed, in this period Britain became one

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[133] E. A. Wrigley and R.S. Schofield (1997), Table 8.12 p. 334.
[134] *Ibid,* p. 532.
[135] *Ibid,* p. 531.
[136] R. B. Outhwaite (1986), p. 4.
[137] Chapters from agrarian history. v. 3. p. 208.
[138] A.H. Jones (1976), pp. 52,60.
[139] J. E. Inikori (2002), p. 48.
[140] A.B. Appleby (1979), p. 865.
[141] A.B. Appleby (1997), p. 882.
[142] E. A. Wrigley and R.S. Schofield (1997), Table 8.12 p. 334.
[143] *Ibid.*

of the leading European countries. If scholars who link together Newton and Enlightenment[144] are right, then the 1687 the year Newton's Philosophiae naturalis principia mathematica was published, is the beginning of scientific revolution and Enlightenment. Surely it was period of enormous rise of British science, literature and culture.

Nevertheless though the population growth occurred from 1685 to 1727 the critical coefficient was below 1 therefore all changes in British society were quantitative not qualitative. For example, during the first half of the eighteenth century the total volume of British overseas trade increased about in two and a half times with average rate of growth 0,5 per cent per annum[145], however, the structure of the trade did not change considerably. Such were the majority of changes in the first half of the century.

What was British society of the time? Undoubtedly, Britain was a leading country of Europe yielded only to the Republic of United Provinces. Old leaders were or in stationary state as Italy or were exhausted by mass emigration to the New World as Spain and Portugal. Time of more capacious reservoirs had not came yet. France only approached its last filling of reservoir, time of gigantic reservoirs in the East as Germany, Polish-Lithuanian state and Russia was far ahead. The Netherlands owning to lesser capacity of reservoir experienced the last filling and the peasant revolution earlier than England, in the second half of the sixteenth century. Due to elite trade, Dutch population had the highest level of development in Europe therefore Dutch artisans had superior skill and Dutch goods were of highest quality. The Republic of United Provinces, rather than Britain was world's technological showcase down to around 1740, and the technical gap between the Dutch economy and those of neighbouring countries remained considerable[146].

The Netherlands were a republic because the elite trade was of highest importance for the country and because this trade is always international one, merchants engaged in it always wanted to take part in government. Political activity is a result of economic interests therefore all societies engaged in elite trade on a great scale had republican constitution, as for example Italian maritime republics. Certainly, it were not democratic but oligarchic republics because ruling elite were merchants. In the Netherlands the ruling elite were regents, who were merchants and financiers.

In England elite trade had become of especial importance from the middle of the seventeenth century and since that time its importance was growing. It is interesting to note that, as it was among Italian city-states during the Middle Ages, the wars for the trade hegemony between England and the Netherland followed. Growing importance of the elite trade increased financial power of merchants that made possible for them to change balance of power in the state. Scholars maintain that these changes did not take place during the so-called Glorious Revolution of 1688-9 and the Declaration of Rights brought about no fundamental alterations in the constitution[147]. The real changes were made later, during the 1690s and early 1700s[148]. Thus, it was not revolution but evolution. All these changes limited power of the king, increased that of the parliament, and were a result of action of the above mentioned mechanism of conformity of social organisation to the achieved level of development.

The political struggle for the changes after 1688 caused twenty-five years of political instability in which Whig party drew support from the wealthy merchants. Accordingly, the international politic of Whigs was active in contrast to isolationist policy of Tory. Considering English politics in the eighteenth century, Barry Coward raised a question: why Tories who were the strongest and most popular political group in England after the Glorious Revolution suddenly collapsed in 1714 and leave the way clear for the Whigs to dominate English political life for more than forty years[149]? Certainly, the matter is not only personal preferences of the Hanoverian

[144] J.B. Shank (2008), p. 14
[145] G. Holmes, D. Szechi (2014), p. 151.
[146] J. Israel (1998), p. 998.
[147] B. Coward (2014), p. 374.
[148] B. Coward (2014), p. 368, 374.
[149] B. Coward (2014), p. 359.

kings. Britain was post-peasant revolution country but it remained pre-industrial. It is intermediate stage when peasant revolution had occurred but industrial one did not came yet. Though the wages were growing, the redundant population existed that allowed for Britain to use external opportunities for development. The leading role of the merchant capital in Britain economy of the eighteenth century manifested itself in that in the first three quarters of the century merchant capital steadily increased its share of the whole national capital[150]. As a result, there were flourishing of British oversea trade and political influence of merchants and financiers, who supported the Whigs, while the agricultural depression made passive many Tory supporters. This made Whigs victorious.

Britain in this period was a limited monarchy with strong elements of oligarchic republic. Britain could not be an oligarchic republic as the Netherlands because the country was too large; consequently, the importance of elite trade was not big enough. Nevertheless, it was really the Age of oligarchy as some scholars dubbed this time[151]. As a whole, the British political system corresponded achieved level of development. Though the parliament limited the power of crown, the electoral system was corrupt. Only about 3 per cent of the adult male population had right to vote, the open ballot made it possible to bought votes by money or to intimidate them. The electoral districts were unrepresentative and outdated. Bribery was widespread, arbitrary rule was usual thing, freedom of speech was limited.

Thus, the course of history of development of pre-industrial England can be explained by the theory of progress I propose. From the fourteenth century all principal changes in English society occurred after changes in the demographic trend in accordance with the model of progress. In its turn demographic changes correspond to conception of the filling of reservoir. English population exceeded critical level during the period 1500-1750 three times – in 1550-1560s, then in 1620-1650s and in 1720-1730s. The first time there were many reserves of intensification and the intensification happened indeed in the second half of the sixteenth century that gave raise of real wages in 1560-1580s. The second time was an especial case; it was last filling of English reservoir that caused the deepest changes in English society and the peasant revolution. The real wages fell to biological limit, nuptiality and fertility fell too while mortality raised that caused population decline. The society made all possible to overcome the difficulties, obstacles for intensification were removed, enclosures reached its maximum therefore wage rates showed the longest rise from 1620 until 1740. In the third time the great transition of labour force from agriculture to industry and trade had begun that manifested the industrial revolution. One of the reactions of the society were parliamentarian enclosures that raised real wages in 1770-1790s (figure 9). Thus, the proposed theory allowed to understand the turning points when qualitative changes in development of England had begun.

In this paper I did not spoke about causes of British industrial revolution. Nevertheless, I hope the reader can see how and why Britain had come the beginning of the revolution, and why the revolution had begun in the second half of the eighteenth century. By this time all possible reserves for further development were completely exhausted. We have seen that human capacity of English reservoir practically did not increased in 1740 in comparison with 1657. If in England there were not abundant coalfields, then after 1750 transition to stationary state not industrial revolution would began. I shall not analyse the process of the revolution itself here because the theme is out of the limits of this paper and it requires separate research.

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[150] G. Holmes, D. Szechi (2014), P. 151.
[151] *Ibid.*

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