INSTITUTIONAL APPROACHES TO TECHNOLOGY AND ECONOMIC HISTORY

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ABSTRACT

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AND ECONOMIC HISTORY

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This thesis is an attempt to reassess the long debated issues of economic history from the perspective of institutional economics. Besides examining different approaches to technology and its impact on economic and social life, it analyzes the role of institutions in history. It discusses the institutional interpretations of the critical developments of economic history such as, the Industrial Revolution and the Great Divergence, with an emphasis on differences between the two scholarly traditions, namely, the Original Institutional Economics and the New Institutional Economics. Although the arguments of New Institutionalists concerning the role of technology in history have been effectively incorporated into the economic history research, the potential contributions of the Original Institutional Economics to the study of economic history have remained for the most part unexplored. The aim of this thesis is to demonstrate the relevance and importance of original institutional analysis with respect to technology and economic history.

Keywords: Technology, the Industrial Revolution, the Great Divergence, the Original Institutional Economics, the New Institutional Economics

ÖZ

TEKNOLOJİ VE İKTİSAT TARİHİNE KURUMSAL YAKLAŞIMLAR

Dildar, Yasemin

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Bu tez iktisat tarihinin uzun sure tartışılmış konularını Kurumsal İktisat'ın bakış açısıyla yeniden değerlendirmeyi amaçlamaktadır. Bu amaç doğrultusunda teknoloji ve teknolojinin ekonomik ve sosyal hayat üzerindeki etkilerine dair farklı yaklaşımlar incelenip, kurumların tarihteki rolü ele alınmaktadır. Asıl Kurumsal İktisat ve Yeni Kurumsal İktisat olmak üzere iki akademik gelenek arasındaki farklılıklar vurgulanarak, iktisat tarihinin Endüstri Devrimi ve 'Büyük Kopuş' gibi önemli gelişmelerininin kurumsal iktisadi yorumları tartışılmaktadır. İktisat tarihi çalışmalarına Yeni Kurumsal İktisatçıların tarihte teknolojinin rolüne dair görüşleri etkin bir biçimde dahil edilmişken, Asıl Kurumsal İktisat'ın olası katkıları büyük ölçüde keşfedilmeyi beklemektedir. Bu tezin esas amacı Asıl Kurumsal İktisat'ın teknoloji ile ilgili analizinin bu tartışmalar açısından önemini ve konuyla ilişkisini göstermektir.

Anahtar Kelimeler: Teknoloji, Endüstri Devrimi, 'Büyük Kopuş', Asıl Kurumsal İktisat, Yeni Kurumsal İktisat

To My Mother

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CHAPTER 1

INTRODUCTION

Economic growth is defined basically as a long-term rise in capacity to supply economic goods in a society.[1] Technological progress is seen as the key resource of this growing capacity. Innovations in knowledge and technology are seen the pre-requisites for any long-term and sustained growth. However, generally accepted view is that technology is only the *permissive* source of economic growth; it is necessary but not sufficient in itself. Efficient use of technology and the progress of technology itself are believed to necessitate the appropriate institutional and social structures.

Economic growth is a recent phenomenon observed only in the last few centuries of human history. Modern economic growth marks a distinct epoch. Before 1800, for thousands of years, the standard of living was roughly constant and did not differ greatly across the globe.[2] World economies were stuck in a so called 'Malthusian trap'.[3] Even during the years of the Industrial Revolution incomes were still at the

[1] "A country's economic growth may be defined as a long term rise in capacity to supply increasingly diverse economic goods to its population, this growing capacity based on technology and the institutional and ideological adjustments that it demands" (Kuznets 1973: 247).

[2] Angus Madison (1982) estimates that the growth of GDP per capita in Europe was zero between the years 500 and 1500.

[3] The Malthusian trap is defined as a mechanism that "ensured that short-term gains in income through technological advances were inetivably lost through population growth" (Clark 2007: 1).

subsistence level. At some point in time, Europe was able to escape that trap.[4] Economic historians and economists have been dealing with the following questions in order to understand the economic history of the modern world and the "true" nature of modern economic growth: Why did the initial escape from the Malthusian trap occur in the West? What was special about England that made it uniquely home to the process of industrialization? Why did modern economic growth begin in the eighteenth century, and not before? What was the role of the technological developments in obtaining modern growth rates? Why did an economic divergence between the West and the East take place? In the search of the answers to these old but still relevant questions, several factors that may have led to the rise of the West and the divergence of income among countries have been highlighted. It is possible to classify those factors into four groups, each of being emphasized in the literature as a source of difference between western and eastern societies, namely, technology, institutions, geography and culture.

In assessing the economic history of the pre-modern period, the stagnationist view assumes that there was very weak, if not non-existent, technological progress and even if there was some technological advance it affected only the size of the population and not the real incomes. There are different views based upon the definition of technology regarding the dimensions of technological change and its impact on society in the pre-modern period. For instance, Braudel states "[i]n a way, everything is technology: not only man's most strenuous endeavors but also his

[4] Some scholars argue that the issue of Malthusian stagnation is still relevant for many poor countries today.

patient and monotonous efforts to make a mark on the external world" (1979: 334). If we accept Braudel's definition, it can be said that throughout history the occurrence of technological progress is inevitable although it is not always epoch-making. The theories that view technology as endogenous to the production process also support this point of view. Based on the idea that technological developments were gradual and cumulative during the Middle Ages, many economic historians oppose to the conventional notion of an industrial revolution. They interpret technological progress as an evolutionary process and a cumulative phase of incremental technological, social and economic change which started back in the medieval times. Moreover, conceptualization of the Industrial Revolution as a technological phenomenon has been challenged in many ways. It is claimed that technological change by itself is not sufficient to explain the Industrial Revolution (Braudel 1979, Pomeranz 2000, Clark 2007). Therefore, the roots of the major rift between the West and the rest, what is called the Great Divergence cannot be solely reduced to technological differences. That is to say, the technological developments that resulted in significantly higher growth rates in the West in comparison to ones in the East should be considered in the context of economic, social and cultural state of society. In this regard, the cultural differences among Eastern and Western societies and their partial role in the divergent development experiences, different institutional structures of these societies, global conjectures and geographical differences among different civilizations are often highlighted to support otherwise technological determinist explanations in the economic history literature.

Some scholars (Kuznets 1973, Mokyr 1990, Mokyr 2002a) who view modern economic growth as the product of 'an unprecedented expansion and application of useful knowledge' largely resulting from the emergence of modern science as the basis of advancing technology view technology as the 'lever of riches' in the final analysis. Obviously these scholars have further explored the sources of technological progress in search of answers for the questions of why particular societies are more technologically creative[5] than others and which factors have a more decisive impact on technological creativity. Even though technology is treated as the driving force of progress within the framework of economic history, contemporary scholarship articulates technology and institutions within social and economic structures to understand how they interact and shape history together.

On the other hand, another perspective attributing particular importance to the institutions has played an important role in economics and economic history since Adam Smith. When the economic analysis is considered, the proposition 'institutions matter' is universally accepted. The question is "to what extent do they matter?". According to institutional economists, institutions play a central role in development patterns of societies; they are the fundamental cause of long-run economic growth. The rationale for giving a central place to institutions rather than technological developments is related to the accumulation in the stock of knowledge. According to institutional economics, this process has been irreversible throughout history.

[5] Technological creativity is seen as the major source of increase in the supply of technology (Mokyr 1990). Indeed, whether technological improvements depend on supply of or demand for technology has remained one of the highly controversial issues. The supply of talent is an important necessity for technological advance to occur but the emergence and the implementation of new technologies necessitate more than individual technological creativity. The demand for new technologies and response of society to new innovations are also decisive.

Because of this, they think that the rise and decline of political and economic units must be related to their organizational structures. The stock of knowledge and technology determines only the potential of a society to draw its material boundaries. But the real performances of societies in realizing that potential are determined by the structure of their political and economic institutions.

The technology-based and institutional explanations for Western economic growth are not diametrically opposed to one another. Scholars such as Mokyr who proclaim that technological change is the major source of economic growth acknowledge the importance of institutions. According to these scholars, institutions are the fundamental components of a society and its culture and they affect choices about technology. They also accept the institutions' effects, permissive or deterrent, upon the use of new technologies. By this way, they think they escape technological determinism. On the other hand, the institutionalists accept the significance of technology in determining the general material framework of the society in which institutional structures operate. In their analysis, institutions are considered the basic determinants of the incentive structure in a society which determines the private returns to innovative activity and the pace of technological progress. However, the technology-based and institutional explanations do not have to be treated as rival explanations. There is an older tradition, namely, the Original Institutional Economics (henceforth OIE) which performs a quite different institutional analysis from that of the New Institutional Economics (henceforth NIE) and it offers a unified theory that recognizes the importance of both technological progress and institutions

for economic success. This assumption constitutes the departure point of the present thesis.

Common to the current discussions concerning issues such as the origin of modern growth rates, the roots of the Great Divergence, the impact of technology on society, the place and role of institutions in the society, is their reliance on the analysis of NIE. The New Institutional Economics emphasizes the efficiency of the organization of the economic realm and the presence of adequate institutions that promote economic growth. Well-defined property rights and the functioning of their enforcement mechanisms, the efficiency of markets, and the mechanisms that reduce transactions costs are the most important issues in the new institutional analysis. On the other hand, OIE differs from NIE in many ways, such as in its basic premises about human behavior, its perspective on property rights and markets, and even in its definition of 'institutions.' OIE makes a wider definition of institutions as the 'habits of thoughts.' Having defined institutions widely in this way, it makes the boundaries of institutional and cultural explanations blurred. Hence, it provides a chance to make a new synthesis of these explanations which have been treated separately in the related economic history literature. Moreover, the original institutional analysis offers a new perspective to the relationship between technology and institutions. First of all, it sees technological progress as a result of collective action rather than of individual innovative creativity. Accepting the socially and culturally embedded nature of technology, it offers a more sufficient explanation to the different technological trajectories of societies. Moreover, within this framework, technology and institutions are not posited externally to each other and also to the socio-

economic system. OIE perceives technology as the provider of the internal dynamics of social change where social change is evolutionary and institutions are the habits of thoughts guiding all human action, including technical action of human beings, throughout their life-span. Therefore, I believe that OIE provides a more realistic and satisfactory analysis of social and economic change with its broader definition of institutions.

This study looks for new answers to the old questions of economic history. I believe that rereading existing literature of economic history through the prism of Original Institutional Economics has a potential to offer fresh insights into the study of classical questions of economic history and political economy. First of all, it would give the opportunity to reassess the long debated issues of economic history from another perspective against a rich theoretical background which is what the present study aims to do. While examining the historical dimensions of these issues, this study also aims to reach some theoretical generalizations about the relationship between technology, institutions and economic growth. In pursuit of these historical and theoretical goals, this thesis is organized in two main chapters in addition to introduction and conclusion.

Chapter 2 reviews the existing literature on technological change and its impact on economic growth in the pre-modern period in detail in order to revisit the different approaches to technology and its impact on economic and social life. This chapter also deals with the historical process that led to the Industrial Revolution and the resulting divergent growth paths called the Great Divergence. The focus of this study

is predominantly on Europe. This has to do with the fact that the Industrial Revolution and the ensuing unprecedented growth rates in Europe are the main focus of the related literature. From the Malthusian interpretations to the endogenous technology theses, various approaches to the relationship between technology and economic growth in the pre-modern period are discussed in this chapter. In addition to the literature review, this chapter also analyzes the historical role of craft guilds in promoting technological advancement, which is a highly controversial issue in the literature. The diffusion and dissemination of technology and the supply-side and demand-side approaches to technological developments are examined in this chapter, as well. I also discuss the evolution of science-technology relationship and its impact on the Industrial Revolution, different interpretations of the Industrial Revolution and other possible factors that led to the Industrial Revolution. Finally, the Great Divergence, one of the major outcomes of the Industrial Revolution which expands the focus of our discussion from Europe to the global scale is brought under magnifying lens. Here I focus on divergent development paths of non-European societies, particularly China.

Chapter 3 turns the focus of discussion to OIE and NIE in interpreting the same historical process with an emphasis on differences between the two scholarly traditions. First of all, I examine the new institutional economists' perception of the rise of the Western world, the Industrial Revolution, the role of technology and institutions in the divergent development paths of different countries. For this purpose, I focus on the works of scholars covered in Chapter 2. Thus, I am able to discuss the institutional explanations in more detail by reassessing the arguments of

the new institutionalists. After specifying the basic differences between the two, that is, the original and new approaches, I closely examine the work of original institutional economists with a view to shedding some new light on the discussion.

In the end I hope to offer some general and specific conclusions in the light of previous discussions about the place of technology and institutions in economic history and their impacts on economic growth and social change. Although this thesis seems to consist of two different parts, one focusing more on the discussions about the role of technology in economic history, and the other elaborating institutional approaches to economic development, it should be seen as a whole. Because I believe that examining institutions and technology separately and giving priority to one of them in shaping historical processes would be a deficient analysis. In order to make a more complete and realistic analysis, one has to make a meaningful synthesis of these two 'allegedly' rival explanations, namely, 'technological' and 'institutional'. I am convinced that incorporating the vision of the Original Institutional Economics that views technological and institutional change as intertwined and co-evolving processes to the discussion has much to offer. This thesis aims to make a case along these lines.

CHAPTER 2

TECHNOLOGY AND ECONOMIC GROWTH IN PRE-MODERN PERIOD

This chapter focuses on economic growth in pre-industrial period. How the economic historians evaluate economic growth in this long period and what role technology plays in obtaining economic growth will be major questions of this part. Because of the special role of Europe in the literature I will first focus on the possibilities of, and constraints on sustained growth in Europe during the medieval and early modern period. The impact of craft guilds as important and long-lived institutions on technological progress, diffusion and transmission of technology, relationship between science and technology, generation and dissemination of useful knowledge in pre-modern period are issues that will be included in the analysis about role of technology on economic growth and social change. I will also examine different interpretations of the Industrial Revolution; first as a radical breakthrough or a gradual culmination of 'industrialization' which had begun much earlier, and then as a technological phenomenon or social transformation. The developments that led to the Industrial Revolution and one of its major consequences, the Great Divergence as highly debated issues will also constitute an important part of this study. When discussing the geographical dimensions of the Industrial Revolution and the Great Divergence, Asia, particularly China, will receive special attention. The explanations for the roots of the Great Divergence which focus on technological, cultural and geographical differences will be investigated in order to achieve a coherent synthesis.

2.1 Technology and Economic Growth in Pre-modern Europe

There are contradictory approaches towards the impacts of technology on economic and social life in the pre-modern Europe. According to 'stagnationist view', there was non-existent or very weak technological progress until the Industrial Revolution. Pre-industrial agrarian economies were constrained by the Ricardo-Malthus trap. The Malthusian model argues that the size of population will be self-equilibrating in the absence of changes in technology or in the absence of extra land available. Even in the case of technological progress, any increase in income leads to population increases. Hence, population increases and limited supply of land which experiences diminishing returns take back initial income rises to a subsistence level. Characterizing pre-industrial economies by this type of stationary Malthusian equilibrium generally leads to a kind of thinking that these economies need some exogenous shocks like emergence of new institutions, new mentalities, climate changes or huge improvements in technology that can reduce the population pressure in order for these economies to experience substantial progress.

Gregory Clark is among the economic historians who explain world economic history before 1800 by this 'simple but powerful' mechanism; *the Malthusian trap*. In this long period there was no upward trend in income per person because "short term gains in income through technological advances were inevitably lost through population growth" (Clark 2007: 1). However, Malthusian era was not completely static: Even if it was 'modest, sporadic and accidental', still there was technological progress. Clark explains that:

> The technology of England in 1800-which included cheap iron and steel, cheap coal for energy, canals to transport goods, firearms and sophisticated sailing ships-was hugely advanced compared to the technology of hunter-gatherers in the Paleolithic, before the development of settled agriculture (2007: 29).

But the crucial factor was the rate of technological advance; it was always slow relative to that in the world after 1800 (typically below 0.05 percent per year which is about a thirtieth of the modern rate) and it was so low that incomes could not escape the Malthusian equilibrium (Clark 2007: 5). So, what technological advance produced in the pre-industrial world was people, not wealth and this is the reason that lies behind the 'stagnant' image of the pre-industrial world. Clark's overemphasis of the Malthusian mechanisms that held all societies in the world in a trap before 1800, leads him to claim that "living standards in 1800, even in England, were likely no higher than for our ancestors of the African savannah" (Clark 2007: 38).

The most interesting part of Clark's argument is about how the economy (British economy, of course) escaped the Malthusian trap, in other words, 'how the statis before 1800 transformed itself into dynamism thereafter'. According to him we do not need a *deus ex machina* like the Protestant Reformation of the sixteenth century, the Scientific Revolution of the seventeenth century or any institutional change which rewards innovation better than it was in the pre-industrial era in order to understand this transformation. There was a surprising source of dynamism in the Malthusian world which is related to changes in population structure. Clark notes that "The forces leading to more patient, less violent, hardworking, more literate, and

more thoughtful society were inherent in the very Malthusian assumptions that undergird pre-industrial society" (2007: 184).

What the Malthusian assumptions imply is that whoever owns more income will have greater reproductive success. To elaborate: the richest individuals in society translate their economic success into reproductive success by having more surviving children than the poorest ones. Because economy was static and opportunities it offers to children of rich fathers were limited, some of these children had to move down on social ladder. This downward nature of social mobility enabled the diffusion of "rich people's values" like patience, ingenuity and hardworking to other classes in society and brought enrichment for all. This was seen as one of the most important motives behind the Industrial Revolution. The transmission mechanisms of these values in society, uniqueness of the demographic regime of England and other factors which prepared the Industrial Revolution in England will be examined separately in the following pages. Sufficient to say that according to Clark what makes the Malthusian era dynamic is demography rather than technology.

According to another leading scholar, namely, Joel Mokyr, characterizing pre-industrial societies incapable of long-term growth is not acceptable; however it is true that growth experienced at that time was limited and constrained. Before the Industrial Revolution, economy was subject to negative feedback; each episode of economic growth run into some obstruction or resistance that prevented it from becoming sustained. Mokyr points out that "pre-modern growth, whether in Europe or elsewhere tended to be limited and bound from above not only because capital

accumulation ran into diminishing returns, but because the economies were all due to negative feedback through at least three quite separate mechanisms" (2002: 5). The first one of these mechanisms is about standard Malthusian model in which income leads to population and population "feeds back" into income. Second one is institutional negative feedback which is caused by the rent-seeking behavior of vested interest groups. Technological resistance is one example of this kind of negative feedback. But for Mokyr, the third and perhaps one of the most important roots of diminishing returns was the narrow epistemic base of technology.

According to this viewpoint, the narrower the "epistemic base" of technology (that is, propositional knowledge[6]), "the less likely it is for inventions to lead to further inventions and sustained technological growth" (Mokyr 2002b: 6). Mokyr writes: "The characteristic of pre-1750 technology is neither that innovation was absent nor that it was more developed in the West. The main characteristic is that it was based mostly on one-off breakthroughs which soon leveled off into a new and higher steady state". Mokyr who focuses on the supply side of technological progress especially emphasizes the role of the period that he called "Industrial Enlightenment" as 'not the key to invention but as the key to sustained and accelerating invention', in paving the way for modern growth (Mokyr 2002b: 10).

[6] Propositional Knowledge is the knowledge of "what" which is about natural phenomena and regularities. It takes two forms: "one is the observation, classification, measurement, and cataloging of natural phenomena. The other is the establishment of regularities, principles, and natural laws that govern these phenomena and allow us to make sense of them" (Mokyr 2002a: 6). It serves as the support for the techniques: "For a technique to exist, it has to have an epistemic base in propositional knowledge. In other words, somebody needs to know enough about a natural principle or phenomenon on which a technique is based to make it possible" (Mokyr 2002a: 13).

He claims that Medieval Western technology had three sources: classical antiquity, Islamic and Asian societies and its own original creativity that differed from classical and modern technology in some important respects. And he goes on to comment as:

> Cardwell (1972) has pointed out that unlike classical technology; medieval technology was not grandiose or extravagant. Apart from a few imposing church, buildings and castles, it was concentrated largely in the private sector. It was carried by peasants, wheelwrights, masons, silversmiths, minors and monks. It was, above all, practical, aimed at modest goals that eventually transformed daily existence. It produced more and better, food, transportation, clothes, gadgets and shelter. It was the stuff of Schumpeterian growth (Mokyr 1990: 56).

The sources of Schumpeterian growth were the increases in the stock of human knowledge but the important point is the application of that knowledge to production process, regardless of that knowledge being new or old. It was the empirical uses of knowledge that enabled medieval society to sustain some sort of Schumpeterian growth, while the economies of classical societies were based on Smithian growth stemming from commercial expansion. Technological progress is the major source of Schumpeterian growth. When we look at the medieval economy, changes in agricultural technology were particularly important, because the majority of population was engaged in farming. Mokyr (1990: 32) underlines the fact that "the transformation of agriculture that began in the early Middle Ages (500 A. D.-1150) took many centuries to complete, but eventually it shaped the European history". The introduction of heavy plow and the creation of three-field system were the essential elements of the agricultural evolution.

The studies of Lynn White and Marc Bloch about the medieval technology were essential in making Mokyr and other economic historians recognize the significance of heavy plough. Lynn White who is primarily interested in relations between technology and alteration of social forms thinks that the medieval era witnessed crucial technological improvements which led to major changes in history. His discussion about the invention of stirrup and its direct responsibility in the emergence of feudalism is perhaps the most striking examples of the strong relationship between technology and social change and it is also very controversial because of his technological determinism. Similarly the inventions of the heavy plough and the harness played a major role in the medieval agricultural revolution according to White. He is of the same opinion with Marc Bloch about the decisive role of heavy plough in 'reshaping medieval peasant society' by not only raising productivity, but by creating the necessities like community work and 'open field' system which were the fundamental elements of the manorial economy (White 1981: 44). The wide application of the heavy plough in northern Europe was the first major element in the agricultural revolution of the early Middle Ages. The second step was to develop harness and use horses for economic purposes. White declares that "by the early ninth century all the major interlocking elements of the (agricultural) revolution had been developed: the heavy plough, the open fields, the modern harness, the triennial rotation-everything except the nailed horseshoe, which appears a hundred years later" (1981:78). All these developments led to an expansion in production and made the accumulation of surplus food possible which is an essential condition for population growth, specialization and urbanization.

In addition to the developments in agriculture which is called evolution by some historians like Mokyr and Braudel and revolution by some others like White, in the later Middle Ages, there were decisive developments in the use of the forces of nature mechanically for human purposes. According to White such developments were so vital that the labor-saving power technology of modern times depends to a great extent upon these medieval achievements in this area. He even uses the expression of "Medieval Industrial Revolution" in order to explain the progress that Europe exhibited towards substituting water and wind-power for human labor in the basic industries by the early fourteenth century. The importance of this revolution based on water and wind was not only the astonishing rise in productivity, but was being a sign of "the new exploratory attitude towards the forces of nature which enabled medieval Europe to discover and to try to harness other sources of power which have been culturally effective chiefly in modern times" (White 1981: 89).

To sum up; contrary to the general belief about the stagnant nature of economy and the lack of technological progress in the Middle Ages, White tries to illustrate that there were important inventions which led to some enormous changes in the economic and social life in the Medieval Era and those technological improvements were decisive in the later technological supremacy of the West. Even though White's excessive emphasis on technological change as prime mover of social systems brings about an incomplete picture of forces governing societies especially because it lacks an adequate description of the political, cultural and social conditions in which technology was developed, his study is still important to stand against the traditional dark image of Middle Ages.

Among the various attitudes towards the medieval technology and growth, K. G. Persson's position is at the other extreme of the spectrum because he directly opposes the Malthusian interpretations. According to Persson, technological progress is the rule in economic history because its sources are endogenous in the production process. He asserts that "even if intentional search for technological progress is weak, there will be systematic forces operating in favor of technological progress and plausible positive feedback in the economic system may also generate self-sustaining growth" (1988: 7). For Persson then, pre-industrial technological change was based on growth of knowledge which is endogenous in production and it was dependent on:

1. Economies of practice that created by positive effects of 'learning by making a product' and 'learning by using the product'
2. Stochastic mutations of known methods (Certain random events and disturbances in productive operations, selection of the best techniques from those random events.)
3. Trial and error
4. Division of labor and regional specialization which are both enhanced by population growth and the growth of markets
5. Population growth (by way of augmenting aggregate demand and "relieving the economy from some of the barriers posed by indivisibilities in learning and equipment") (Persson: 1988: 7-11)

Moreover, these endogenous forces in the process of technological development generate technological sequences. A technological sequence is regarded as having a deterministic trajectory. This determinism predicts a certain evolution of

technologies over time for specific activities like the methods of cultivation on land. What lies behind this assertion is the claim that "given a specific standard method we will consider the evolution of technology as resulting from a selection from small variations close to the original standard model" (Persson 1988: 12). In other words, the way that important technological sequences, such as the sophistication of metallurgy or the beginnings of agriculture, have emerged and developed was broadly similar in many different cultures even though there was no interaction and diffusion of technology among them. Mokyr criticizes Persson's theory of endogenous technological change on this ground; he finds it inadequate in the explanation of "why these technological sequences occur and where they do, or what role other forms of technological creativity play" (Mokyr 1990: 163). Moreover, according to Mokyr, Persson was wrong in arguing that all the technological progress in the pre-modern era consisted of continuous sequences of microinventions. The windmill, spectacles, the mechanical clock, the moveable type, and the casting of iron which were invented in the later Middle Ages are classic examples of macroinventions.

The main weakness of Persson's argument seems to be his claim that societies with comparable levels of development experience similar technological trajectories because of the endogeneity of technological progress. There may be other social, political or cultural factors that shaped the technological path of societies in addition to endogenous and almost automatic changes in technology. But yet, Persson's theory is a significant contribution to the analysis of technological change in the pre-

modern era, especially because of its special emphasis on incremental improvements in the technological progress.

2.2 Useful Knowledge, Dissemination of Technology and Craft Guilds

Mokyr argues that modern economic growth is the product of an unprecedented expansion and application of useful knowledge. (2002a, 2002b) 'Useful knowledge' as a term used by Simon Kuznets consists of two types of knowledge; one is propositional knowledge (knowledge 'what'), the other is prescriptive knowledge (knowledge 'how'). It can be said that if propositional knowledge is regarded as *episteme*, prescriptive knowledge is *techne*. Mokyr further notes that "an addition to propositional knowledge is a *discovery*, the unearthing of a fact or natural law that existed all along but that was unknown to anyone in society. An addition to prescriptive knowledge is an *invention*, makes it possible to do something hitherto impossible" (2002a: 12). Thus according to Mokyr, for a technique to exist, it has to have an epistemic base in propositional knowledge. He goes on to explain: "An existing body of propositional knowledge "maps" into a set of instructions that determines what this economy can do…Among these feasible techniques, a few are selected for actual execution, which we call them prescriptive knowledge" (Mokyr 2002a: 16). Lack of necessary epistemic base was an important obstacle to discover and improve some feasible techniques in Medieval Europe and in many other societies according to Mokyr. However, the existence of some piece of propositional knowledge does not always guarantee that any mapping will occur into prescriptive

knowledge. How and when propositional knowledge provides the epistemic bases for technology depends on the tightness[7] of that propositional knowledge which has two dimensions; confidence and consensus (Mokyr 2002a: 6).

According to Mokyr, much of the technological progress before 1800 was only consisting of "singleton techniques", that is, the base for the technique is so narrow that all that is known is the trivial element that a particular technique works or does not work. The widening of epistemic bases after 1800 was 'a sign of a regime change in the dynamics of useful knowledge' and the most important factor that led to such a change was *the Industrial Enlightenment* which is a Western phenomenon. The Industrial Enlightenment transformed the two sets of useful knowledge and the relationship between them in three ways: First, it reduced the access costs by surveying and cataloging artisanal practices to determine which techniques were superior. Second, it helped in understanding why particular techniques worked, connecting them to the formal propositional knowledge of the time and providing the techniques with wider epistemic bases. Third, it made the interaction between two groups of people easier; the ones who 'controlled propositional knowledge' and the ones who 'carried out the techniques contained in prescriptive knowledge' (Mokyr 2002a: 35). One remarkable example of the success of this kind of interaction was the triumph of the continent by combining France's success in propositional knowledge and British success in prescriptive knowledge. As these two forms of

[7] The tightness of a piece of knowledge is defined as "the ease with which others can be persuaded to accept it. It depends on the consensus-forming mechanisms and rhetorical tools that are admissible in distinguishing between it and its alternatives" (Mokyr 2005: 209).

knowledge co-evolved, they enriched one another and created a positive feedback mechanism that had never seen before.

However, there are also some dubious views about the importance of the Industrial Enlightenment in the acceleration of technical innovation during the eighteenth century. According to Epstein, for example, what was more decisive in this process was the role of the "increasingly mobile technicians who shared both propositional and prescriptive knowledge among themselves" (2005: 34). Technical knowledge of pre-modern craftsmen and engineers was largely experience-based. There were cognitive limitations to process and the transmission of this kind of knowledge. Because of this, "the principal, endogenous bottleneck to pre-modern technical diffusion and innovation was the cost of person-to-person teaching and demonstration" (Epstein 2004: 382). Apprenticeship was the most widespread practice in the acquisition and intergenerational transfer of technical knowledge outside the family. It contributed substantially to the collective nature of pre-modern knowledge. However, the most important factor contributed to innovation was "knowledge sharing between skilled peers" which occurred on-site and through migration, rather than the 'intergenerational transmission of knowledge' (Epstein 2005: 7).

Besides acquisition and sharing, another important issue was spatial transfer of technical knowledge. There are three ways of technical knowledge to disseminate: "through publicly available texts, through patents, and through migrating individuals" (Epstein: 2005: 24). The first way was not very successful because of

the tacit nature of experience-based knowledge. For instance, written manuals were incomplete and at times misleading. Because of similar technical and cognitive problems, pre-modern patent rights did not also play a major role in innovation before 1800. The most effective way of transferring knowledge was the traveling of craftsmen and engineers due to the implicit nature of technical knowledge which made one-to-one training necessary (Epstein 2005: 24). There were four major obstacles to the successful transfer of technical knowledge: trade secrecy, guild opposition to innovation, information and transport costs which restricted labor mobility, and the absence of a 'local skills base' that could successfully integrate new techniques. According to Epstein, the last two were the most important ones. He writes:

> In conclusion, the main causes of low rates of pre-modern innovation were the high information and reproduction costs related to experience-based knowledge. The principal source of diminishing returns to technicians' knowledge seems to have been the poor interactions between the dispersed craftsmen and engineers, rather than the narrowness of the pre-modern crafts' epistemic base (Epstein 2004: 385).

Growing state competition and urbanization diminished the costs of technical dissemination in time. Although the direction of the causation is not clear, there was a high correlation between urbanization and rising migration of skilled workers. For Epstein: "Thanks to migration by skilled workers, each new technological leader could draw on the accumulated knowledge of its predecessors, recombine it with the domestic knowledge pool, and develop it further" (Epstein 2004: 386). These circumstances created a process like the Industrial Revolution.

According to Epstein, guild opposition to innovation was not an important obstacle to change because guilds were not strong enough to enforce their wishes. In fact, the impact of craft guilds on the pre-industrial economy is a highly controversial issue. Historians have been divided on this topic. While some argue that guilds as the representatives of economic conservatism exercised harmful monopolies, others claim that they were economically powerless, and some others strongly believe that guilds were beneficial to the economy. The fact that England was the first country to lose its guilds seems to validate the negative view of guilds as obstacles that had prevented European economy from realizing its full potential. Mokyr is among those historians who blame guilds as being a part of technological resistance in pre-modern Europe. According to him, what makes Britain unique in European continent was the relative failure of technological resistance in Britain; and the main factor that diminishes the resistance to technology in Britain was the weak position of the guilds (Mokyr 2002a: 260). Although their initial services were beneficial to economy, they eventually became an obstacle to competition and innovation by setting up strict and detailed rules about three elements of production: "prices, producers and the participation". Mokyr underlines this fact as:

> It is important to stress that many of those guilds were originally set up to fulfill different functions, acting as clearing houses for information, organizational devices to coordinate training and quality control, mutual insurance support organizations, and sincere attempts to prevent opportunism and free riding on others 'reputations. Yet over time many of them degenerated to technologically conservative bodies (2002a: 259).

According to Epstein, however, exaggerating the monopoly power of craft guilds is misleading since most craft guilds were price takers rather than price makers and they wither away if they failed to respond to changing demand with innovation (Epstein 2008b: 159). For Epstein, craft guilds' primary function was to enforce contractual norms that reduced opportunism by masters and apprentices, that is, to share the costs and benefits of training among its members. So they were "cost-sharing rather than price-fixing cartels" (Epstein 2008a: 56). Persson is also against judging the guilds as cartels that raise prices above competitive levels by restricting the entry into work and by limiting production. He points out that "a guild had a monopoly or a semi-monopoly in manufacturing and trade in its products within the city. But these advantages did not go as far as a right to determine the size of the guild nor the prices of goods" (Persson 1988: 53). According to him, the basic contribution of the guild system to the economy was the institutionalization of the bargaining process; "changing the nexus of bargaining from head-to-head encounters to negotiations between organizations representing the trading partners as well as, in most cases, a third party representing the public interest" (1988: 53). Moreover, the guild system diminished transaction costs since prices and quality were regulated. It also contributed to the insurance of its members. Apart from all the 'efficiency' debates, the guild system was beneficial for the encouragement of specialization in crafts and accomplishment of skills in the medieval and early modern period (Persson 1988: 54).

In the matter of guilds' behavior about technological change, Epstein opposes to both of the claims that guilds produced no endogenous innovation and that they

refused to adopt innovations from outside. According to Sheilagh Ogilvie, one of the most ardent advocates of the view that guilds were systematically opposed to technological change, only the innovations that did not threaten the well-being of established guild masters could be adopted. Innovations that the guild masters perceived as endangering their benefits were exposed to resistance and guild opposition to technological change did not frequently fail as Epstein implies (Ogilvie 2008: 169). Ogilvie's stress on political economy of guilds is important because attributing craft guilds a degree of internal homogeneity is misleading. With respect to innovation, the motives of large-scale masters generally diverged from small-scale craftsmen. In other words, poorer craftsmen whose main source of livelihood was their skills, frequently opposed 'capital-intensive' and 'labor-saving' innovations whereas wealthier artisans look on these kind of innovations more favorably. The balance of power between these two major interest groups was crucial for the guild's attitude towards innovation. Guilds that allowed social polarization between their members in terms of the scale of their business were more flexible and innovative than those dominated by small-scale producers. The decision to innovate was also effected by relations between the guilds' constituencies and the state, the properties of "guild landscapes in which craft guilds were embedded" (Epstein 2008a: 169). That is, the claim that guilds have a tendency to oppose outside innovation spontaneously is not true.

As for the claim that guilds produced no endogenous growth, Epstein's position is completely different. In his view, craft guilds were main direct resource of pre-modern technical innovation for three reasons. He clarifies his statement as follows:

> First, they enforced the rules of apprenticeship against free-riding and exploitation. Second, it offered institutional, organizational, and practical support to the migrant apprentices, journeymen and masters who transferred their technical knowledge from one town and region of Europe to another. Third, it supplied incentives to invention that the patent system did not by enforcing temporary property rights over members' innovations (Epstein 2004: 386).

Besides their systematic contribution to increase the supply of technology, craft guilds had also an involuntary contribution to the technological progress as a consequence of "random institutional variation". Craft innovation was largely an unforeseen product of everyday practice, "an outcome of small-scale and incremental experiment, and of random variation" (Epstein 2008a: 70). Mokyr also accepts the role of craft guilds in dissemination and intergenerational transmission of technological information. According to him, there is no contradiction between such a role and the inherently conservative role that became an obstacle to innovation. But Ogilvie thinks that guilds and those three factors that Epstein mentioned were neither necessary nor sufficient for technological innovation. For her, guild apprenticeship and journeymenship were not essential for transmitting technical knowledge between generations. There were 'encroaches' who did not take guild training but managed to learn necessary technical expertise. Similarly, guild tramping requirements were not necessary for disseminating innovations geographically. She notes that young workers in pre-modern Europe were already highly mobile. The Netherlands, for example took the advantage of high labor mobility and technological innovation, even though Dutch guilds did not require journeymen to tramp (Ogilvie 2008: 33). Despite all their inefficiencies and welfare loses that they created, craft guilds' long

persistence can be explained by their redistributive role in favor of powerful groups according to Ogilvie.

Interpreting the Industrial Revolution as the product of a long process of innovations during the earlier centuries rather than a sudden break with the previous period is widespread among historians now (Braudel 1979, Epstein and Prak 2008). These innovations were incremental microinventions (Mokyr 1990). The source of these innovations must have been primarily the organization of production and guilds were the predominant institution that governed urban industries in Europe. Epstein and Prak argue that “given the face-to-face character of the transmission of skills and hence technology, communities of craftsmen were, at least potentially, the sites where technological development and innovation were most likely to occur” (Epstein and Prak 2008). Despite the fact that their rent-seeking activities was a burden on society and their opposition to innovation sometimes became obstacle to technological progress (especially in their maturity faces when they have enough power to enforce their wishes), their role in reproduction of the skilled workforce, setting quality standards, reducing transaction costs and information asymmetries and especially in supporting the mobility of skilled workforce who transferred technical knowledge still makes guilds important institutions that contributed to technological progress in pre-modern Europe.

2.3 The Industrial Revolution

So far, the Industrial Revolution as a much debated issue is considered either as a sudden break with the past or as an outgrowth of processes that began in the Middle Ages or even before. The events of the Industrial Revolution are well known and agreed upon but their interpretations are still controversial. The questions like what caused the Industrial Revolution, why in Europe, rather than somewhere else, why in the eighteenth century not before are still important and not agreed upon.

Around 1800, the iron link between population and living standards was broken in England. Thanks to the investments in expanding the stock of useful knowledge, we could observe modern growth rates after 1800. According to Clark, the exogenous growth theories which either focus on changes in institutional set up before 1800 or technological advances fail to explain the Industrial Revolution. The basic problem about technological explanations is the fact that the appropriability of knowledge does not seem to had improved until long after the Industrial Revolution was under way. For the institutional explanations, there is no evidence that institutions can be a determining factor in the efficiency of economies, independently from that economic system (Clark 2007: 212).

For Clark, it is important to indicate that the Industrial Revolution was a gradual process, stretched back about hundreds of years. Its appearance as an abrupt departure instead of the continuation of more gradual changes was created by "accidents and contingencies" such as enormous population growth in England after 1760, British military successes in the Revolutionary and the Napoleonic wars, and

the development of the United States (Clark 2007: 231). It is clear that something happened around 1800 that enabled England to escape from the Malthusian trap. However, when we look at efficiency growth rates during the Industrial Revolution, we could not observe a remarkable acceleration. For the period of more than a century, England experienced steady efficiency growth before 1760. Clark illustrates that “the efficiency of production of income increased only 0.33 percent per year from 1760 to 1869, a rate fast by the standards of the Malthusian era but still slow by modern benchmarks” (2007: 241). So, it would be more sensible to interpret the Industrial Revolution as “one phase within the general transition from Malthusian equilibrium to modern growth”, which the English economy began to experience around 1600.

The unexpected explosion in English population in the years 1750-1870, the limited land area and limited productivity gains in English farming made impossible to meet the food and raw material demands of the English economy by domestic agriculture. By the 1860s, England’s food and raw material imports already reached to 22 percent of its GDP. These imports had to be paid for by exports of manufactured goods. As Clark states: “it was this, rather technological advances, which made Britain “the workshop of the world” (2007: 248). This unusual growth of population together with the simultaneous expansion of cultivated area in the United States was more important than the specific technological advances for the Industrial Revolution. In fact, there was not any significant gap between England and its competitors, the United States and the Netherlands in terms of technological progress by 1850. Furthermore, there was not also any institutional change that might have brought new

incentives. Acceleration in productivity still came from the supply side but not because of unusual rewards to innovation. People just began to respond differently to incentives that had been in place for generations. The characteristic of the population were changing through the Darwinian selection which supported “survival of the richest”. Spread of the middle-class culture throughout the society took place through either cultural (the sons learned how to succeed economically from their fathers) or biological mechanisms (the sons shared innate characteristics with their fathers (Clark 2007: 120). Since this process which created an economically successful and potentially innovative population was slow and had its origins before the ages, the Industrial Revolution should be interpreted as an evolutionary process rather than a revolutionary break.

Mokyr is among the historians that Clark opposes to, because of his technological explanation of the Industrial Revolution. According to Mokyr, identifying the Industrial Revolution with economic growth may have some downsides. For example, per capita measurements may be deceptive, because it depends on population changes. Moreover, economic growth need not be result of an industrial change; it may be related to agricultural or commercial developments. It is better to think that the Industrial Revolution in terms of ‘accelerated and unprecedented technological change’ (Mokyr 1990: 82). Mokyr points out that “per capita consumption and living standards increased little initially, but production technologies changed dramatically in many industries and sectors, preparing the way for sustained Schumpeterian growth” (Mokyr 1990: 83). Those who claim that the technology that is used during the Industrial Revolution had already developed

earlier confuse scientific knowledge with technical ability. Although the innovations that made up the Industrial Revolution did not depend on new scientific knowledge, one has to acknowledge that the technical problems that the engineers of the Industrial Revolution tried to solve were difficult. It took a long time to solve them. Hence, the role of talented and creative people in this process was undeniable. Generally there are some factors that determined the supply of ideas in a society such as religion, education, willingness to bear risk. Apart from the regular tendencies in a society to raise innovative people, according to Mokyr, the scientific revolution of the seventeenth century and the Enlightenment movement of the eighteenth century made critical contributions to increase technological creativity in Europe. These two historical events were also decisive in timing of the Industrial Revolution (Mokyr 2002a: 29).

Mokyr makes two distinct definitions for *macroinventions* and *microinventions* drawing an analogy between the history of technology and the theory of evolution which distinguished micromutations and macromutations. Microinventions are "small, incremental steps that improve existing techniques already in use" (Mokyr 1990). Macroinventions are inventions that create technological breakthroughs. These two were not substitutes but complements for the technological progress. Without macroinventions, the continuous process of improving existing techniques would run into diminishing returns. Without the macroinventions of the Industrial Revolution, we probably could not mention such a breakthrough in history. But the technological ideas of the Industrial Revolution became macroinventions because they could be built, reproduced and they worked, so complementary microinventions

were “as much the center of the Industrial Revolution as the great ideas themselves” (Mokyr 1990). Mokyr underlines that: “the real difference between the Industrial Revolution and previous clusters of macroinventions is not that these breakthroughs occurred at all, but that their momentum did not level off or peter out after 1800 or so. In other words, what made the Industrial Revolution into the “great divergence” was the persistence of technological change after the first wave” (Mokyr 2002a: 8). What made technological change persistent was widened epistemic base of knowledge as a result of the historical process that Mokyr called ‘Industrial Enlightenment’. According to some other scholars like Rostow, the Industrial Revolution was unusual not just because the changes of this period affected a wider group of industrial activities differently from the technological clustering’s of previous ages. What distinguished the Industrial Revolution was the fact that technological change was continuous and cumulative. To borrow A. N. Whitehead’s words, industrialization brought with it the “invention of the method of invention” (Von Tunzelman 2003: 85). This is exactly what Mokyr claimed, when saying that the Industrial Enlightenment was ‘not the key to invention but as the key to sustained and accelerating invention’.

Mokyr claims that his viewpoint is not technologically determinist, despite of an overemphasis on technology as driving force of society, since he regards useful knowledge and institutions as the fundamental parts of culture and society that determine choices about technology. According to him, “the technology feedback into knowledge” and institutions are equally important. He writes: “when this

positive feedback gets strong enough, a self-sustaining, “autocatalytic” process unfolded, which we might call the European Miracle” (Mokyr 2002b: 7).

It can be said that Mokyr’s conceptualization of technology is consistent with the linear model of technology; “technology originates in scientific discoveries, which became embodied in technical inventions, then became commercialized and widely diffused, resulting finally in promoting economic growth” (Von Tunzelman 2003: 86). Mokyr who denies the aphorism “Necessity is the mother of invention” focuses on the supply side of technological progress and claims that “invention is the mother of necessity” because necessity is always inherent in human insatiability; in his words: ‘new technological possibilities often give rise to hitherto unrecognized desires’ (Mokyr 1990: 151). An obvious alternative of this supply side approach is the demand-pull explanations of innovation and technological change. According to Braudel, technology is necessary but not sufficient for economic development, due to the fact that “the efficient application of technology lags behind the general movement of the economy”; it has to wait to be demanded (Braudel 1976: 566). Almost every invention that presents itself has to wait for years before being applied to real life. “Steam engine, for example, was invented a long time before it launched the industrial revolution-or one should say before being launched by it?” (Braudel 1976: 335). Because of this, the history of inventions, taken by itself, may be misleading. Braudel goes on to elaborate this as follows:

> In other words, there are times when technology represents the possible, which for various reasons-economic, social or psychological-men are not yet capable or fully utilizing; and other times when it is the ceiling which materially and technically blocks their efforts. In the latter case, when one

> day the ceiling can resist the pressure no longer, the technical breakthrough becomes the point of departure for a rapid acceleration (1976: 335).

The force that overcomes the obstacle is always more than a simple internal development of technology. No innovation has any value without "the social pressure which imposes it" (Braudel 1976). There is not such a thing as 'technology in itself', technology is always a part of the social system. Even the advocates of the linear model of technology admit that the supply of technology as invention or innovation is not completely exogenous to society. Moreover, technological developments and their repercussions in economy cannot exist in isolation from other aspects of human life without being affected by other economic and social conditions. Technology is only an instrument and people may not always know how to use it or sufficient conditions to use that technology may not develop simultaneously with that technology. Lynn White states that 'a new device merely opens a door; it does not one compel to enter' (White 1988: 28). Braudel would probably say that 'a new device merely creates a potential to open a new door'. Thus technological change by itself is inadequate to explain the Industrial Revolution.

John U. Nef was one of the first to emphasize the importance of demand sourced factors that prepared the Industrial Revolution. According to him, 'early industrial revolution' of England took place between 1540 and 1640 and demand-push factors in this industrial expansion were crucial. England was innovative in the industrial sector with large factories and the widespread use of coal. However, the enlargement of the domestic market was the main driving force of the industry by way of two channels. The first was the rapid population growth and the second was the large rise

in agricultural incomes, which turned peasants into consumers of industrial products (Nef 1964: 140-143). What Nef's argument implies is that the English industrial revolution had already begun in the sixteenth century and progressed through stage by stage.

It is possible to identify several revolutions within the 'industrial revolution': in agriculture, demography, transportation, technology, trade and industry. Generally much attention was given to mechanical inventions, metallurgy and new energy sources in the discussions on the Industrial Revolution because the impacts of developments in these areas had been felt more quickly in economy and society than the relatively slow changes in agriculture. The role of agriculture in the Industrial Revolution has been always debated; some scholars argued that the agricultural revolution was *sina qua non* of the developments in industry, others argued that its contribution was not that important. For example, Paul Bairoch argues that agriculture played a primary role in the Industrial Revolution. According to him, it is impossible to achieve significant industrial growth without a prior development in agriculture. In England, progress in agriculture initiated an important change in the rate of population rise which increased demand not only for agricultural but also for manufactured goods. This demand, he says, "was to prove a powerful stimulus in the development of artisans' workshops, which the Industrial Revolution was gradually to transform into factories" (Bairoch 1976: 484). Similarly, for E.L. Jones, the primary condition of industrial success was to have agricultural output rising faster than the population and the critical period for Britain was between 1650 and 1750 (Jones; in Braudel 1976: 558). According to A. M. Wood, what made

industrialization possible was the agrarian capitalism. For her, the conditions created by agrarian capitalism-in property relations, nature and extent of domestic market, transformations in population profile and trade were all more substantial and wider than technological improvements. (Wood 1999: 155)

On the other hand, some other historians are suspicious about the role of agriculture in industrial revolution. H. J. Habakkuk argues that the increase in agricultural output is not to be regarded as a precondition for growth when it normally accompanied the acceleration of growth (Habakkuk 1965: 123). M. W. Flinn also believes that agricultural developments would not play a more than a modest role in stimulating an industrial revolution (Flinn; in Braudel 1976: 558). According to Clark, agricultural revolution is a myth, created by historians who overestimated the gains in output from agriculture. In Clark's point of view, productivity growth rate in agriculture was modest, lower than for the economy as a whole (Clark 2007: 238).

Even though new techniques and crops were invented and adopted very slowly in agriculture, their repercussions were great because agriculture was the main occupation of majority of the population for thousands of years. No matter how much slow and imperceptible it was, agriculture was a central part of this complex picture and closely related to the developments in industry. As Braudel points out, in the case of social change, rapid and slow changes are inseparable:

> In any attempt to analyze the revolutionary process, the most difficult part is always making the connection between the long and the short-term, recognizing their relationship and the links between them. …Industrial Revolution consisted both of a rapid sequence of events and of what was clearly a very long-term process: two different rhythms were beating simultaneously (1976: 537).

According to Braudel, industrial revolution was at least twofold: Revolution because it brought visible changes in a sequence of short-term events. But at the same time it was a long and gradual process, advanced in "discrete and silent steps" as can be seen from the developments in agriculture. There was also "an unrecognized industrial pre-revolution" in the gathering of discoveries and technical advances before the Industrial Revolution. Braudel highlights that: "with the coming of steam, the pace of the West increased as if by magic: But the magic can be explained: it had been prepared and made possible in advance. To paraphrase Pierre Leon, first came evolution (a slow rise) and then revolution (acceleration): two connected movements" (Braudel 1976: 372).

Pomeranz with his provocative and insightful book, "The Great Divergence" brought a new perspective to the Industrial Revolution debate and took the interpretation of the Industrial Revolution as a discontinuous event to the fore again. Like Braudel, he argues that technological inventiveness was necessary for the Industrial Revolution, but it was not sufficient. Moreover, in his point of view, it was not "uniquely European" (Pomeranz 2000:17). The crucial factors in the explanation of the Industrial Revolution are ecological, according to him, not technological, institutional or cultural. Pomeranz suggests that England was able to escape the Malthusian trap of resource scarcity and launch the Industrial Revolution because of two accidental circumstances: convenient coal supplies and "geographical good luck", that is, access to the abundance of the New World (Pomeranz 2000: 66). As a crucial technological input, coal allowed industry to break out of the energy

constraints and America provided England raw materials and a market for its finished goods.

It seems that there is no consensus among historians on how to explain the location and timing of the Industrial Revolution. There are also different views on the pace of it, whether it was a sudden break or continuity; a revolution or evolution. However it is clear that it strongly contributed to an uneven distribution of income among societies. The so called-theGreat Divergence will be concern of the following section.

2.4 The Great Divergence: Western Europe versus East Asia

Pomeranz's "The Great Divergence" is the most influential work of the California School that challenged the classical economists' and their followers' claim that Europe was ahead of Asia for a long time due to various reasons: her minimal government and openness to trade (Smith), the unique demographic regime (Malthus), capitalist institutions and the mode of production (Marx). Moreover, according to Pomeranz, the history of East-West divergence was more complicated than depicting East as the polar opposite of Europe as seen in the studies of modernization theorists. There should be more room for contingency and unexpected outcomes than rational thought and efficient institutions in the explanations of divergence. Firstly, Pomeranz challenges various theories arguing, Europe had generated an economic advantage before 1800. Before 1800, there were strong resemblances between China and Europe in nearly all significant economic

indicators, including standard of living, market development, agrarian productivity, and institutional structures. As against E. L. Jones's claim that "Europeans" were already uniquely wealthy before industrialization, he shows that Europe had an advantage neither in human nor in physical capital before 1800 (Pomeranz 2000: 31).

Another conventional explanation for the uniqueness of Europe is that institutions of Europe were more conducive to economic development. Pomeranz suggests that if we define "institutions" broadly enough, this argument must be true for northwestern Europe. But if we take the most common form of institutional argument that Europe had more efficient markets than non-European societies, it is not explanatory. Because, a comparison of laws and customs regulating markets shows that land, labor and product markets were far from perfect competition in Europe than those in China. For the technology based explanations of divergence, Pomeranz demonstrates that China and Europe did not differ significantly in their basic levels of technology prior to the nineteenth century. Europe's technological superiority sprang from post-1750 inventions (2000: 44). According to Pomeranz, even if we accept that the elements of the "scientific culture" emerged in England in the 150 years before 1750 like increased literacy and printing and relatively accessible public lectures were on the basis of this sudden burst of inventiveness, "the European configuration" did not represent the only path to technological progress. Other areas continued their own patterns of invention. Pomeranz notes, for instance, that Chinese interest in the physical sciences and mathematics increased outstandingly in the seventeenth century. He reminds that non-European societies retained noteworthy technological advantages in many areas even in the late eighteenth century, and "it was not

inevitable that they would turn out to seem relatively unimportant in the long run" (Pomeranz 2000: 45). He claims that, in a strictly technological sense, the central technologies of the Industrial Revolution like the steam engine could have been developed outside of Europe, too. In order to understand why it was in fact developed first in Europe, we also need to investigate other conditions instead of focusing on only the differences about technological creativities of societies.

Another resemblance between China and Europe before 1800 was the ecological constraints. They were running into severe resource limits by 1800, both were nearing exhaustion in terms of land for agriculture, supplies of fuel and natural resources:

> The most "fully populated" and economically developed parts of the Old World all seem to have been headed for a common "proto-industrial" cul de sac, in which even with steadily increasing labor inputs, the spread of best known production practices, and a growing commercialization making possible ever-more efficient division of labor, production was just barely staying ahead of population growth (Pomeranz 2000: 207).

Two factors that mentioned before were crucial in escaping from this proto industrial *cul de sac*: the presence of convenient supplies of coals and colonies. England was fortunate because her coal supplies were close to abundant water and accessible ports whereas Chinese coal supplies were in the northwest, far from the dense populations of Yangzi Delta and remote from transportation routes. Coal allowed England to get through bottlenecks in fuel supply and paved the way to the industrialization by making the steam engine economically feasible. Because of the peculiar institutions of the New World colonies (The Caribbean and Brazilian plantation complex and the

southern American cotton and tobacco production system), they became a different kind of periphery, not only supplying raw materials like timber, steel, cotton but also providing a demand for British industrial products. Pomeranz writes: “For the New world and the slave trade offered what an expanding home market could not have: ways in which manufactured goods created without much use of British land could be turned into ever-increasing amounts of land-intensive food and fiber at reasonable prices.” (2000: 269) Therefore, without the overseas resources, Europe could have utilized more labor-intensive technology to overcome its resource constraints like China did, and “in that case it would have diverged far less from China and Japan” (Pomeranz, 2000:4).

According to Jones, this image of Europeans being the ‘passive recipients of good fortune’ is extremely prejudiced and its aim seems to be what David Landes called “delegitimizing the West”. Jones points out that “resources do not exploit themselves, nor lend themselves to promoting industrial revolution unless numerous conditions snap into place with “remarkable coherence” (2000: 858). Incentives are required to sustain efforts at solving problems. European advantage lies in building right means for exploiting the external sources. Similarly, Landes claims that two kinds of return to colonial domination; booty and systemic exploitation, would have been useful only in right hands (Landes 2003: 35-36). He has an explanation for why the European hands were the right ones, which will be mentioned in the coming pages.

Pomeranz is well aware of the fact that these two geographic advantages did not have to lead to an industrial breakthrough. But it is clear that they raised the possibility and made such a breakthrough much easier to sustain. These favorable resource shocks gave extra breathing room for the emergence of other innovations in Europe. This does not mean they only can explain the technological creativity "but the two factors worked hand in hand, each increasing the rewards of the other" (Pomeranz 2000: 211). He explains the role of geography in Europe's coal breakthrough as follows:

> Thus we see that technological expertise was essential to Europe's coal breakthrough, but the development of that expertise depended on long experience (and many failures along the way) with abundant, cheap supplies. This experience was possible because artisanal skill, consumer demand, and coal itself were all concentrated near each other. Without such geographic good luck, one could easily develop lots of experience in an area with a limited future (e.g., in using and improving wood furnaces) and not proceed along the track that eventually led to tapping vast new supplies of energy (2000: 66).

Similarly, what made steam engine effective were incremental improvements from numerous craftsmen. Without the contributions of nearby artisans, the learning by doing that became possible with the close coal fields and the low cost of coal, the steam engine could have seemed not worth to promoting.

To sum up; there are four important factors that created Great Divergence which was an 'unexpected leap by England ahead of the rest of Eurasia began around 1800', according to Pomeranz. First and perhaps the most important one is Europe's exploitation of New World. Second is Europe's ecological advantage of backwardness. Third is the fortunate location of Britain's coal deposits and its

relationship to the development of the coal/steam complex. Fourth is the wave of industrial innovations (Pomeranz 2000: 283).

Clark is opposed to give a central place to geography in the explanations about the roots of great divergence. Although he completely agrees with Pomeranz about similarities between China, Japan and Europe with respect to land, labor and capital markets in 1800, he still thinks that “Pomeranz is caught in the Smithian straitjacket” (Clark 2007: 261). Because Pomeranz still assumes that markets and incentives are sufficient for economic development unless there is some external obstacle. In his view, If China could not develop despite having similar market structures with England, there must be some exogenous factor like geography that impeded development. However Clark discusses the Industrial Revolution as a product of “a differential response of people to market incentives that had long been present” rather than product of “Smithian perfection of the market” (Clark 2007: 262). Moreover, Clark also opposes to the interpretation of the Industrial Revolution as an abrupt and unexpected break as Pomeranz suggests. As discussed in the previous section, according to Clark, the Industrial Revolution was a “step on a continuum”, a phase in a long and gradual transition.

According to Clark, all these societies, England and its Asian competitors, China, Japan and India, were on “the path to an eventual Industrial Revolution”, but England was faster than others in establishing a bourgeois society through all ranks of the population. There are two possible explanations to why Asia was behind Europe. First one is that, the Malthusian constraints operated much more tightly in

England; the population increases were much faster in China and Japan. This made selective survival process more severe in England. Secondly, the demographic systems of Asian societies were providing less reproductive advantage to the rich. There was not as much downward social mobility as in England, so the middle-class culture was not spreading as fast as in England. Clark's answer to the question "Why the Industrial Revolution occurred in England?" is that: "England's advantage lies in the rapid cultural, and potentially also genetic, diffusion of the values of the economically successful throughout society in the years 1200-1800" (Clark 207: 271).

Until now, Clark's analysis was about how the things began, but there are also other important questions; "Why divergence?" and "Why it became 'Great', have further deepened over time after 1800?" According to Clark, there might be three different sources of differences in income per person across societies: differences in capital per person, differences in land per person and differences in efficiency. Differences in efficiency is the ultimate explanation for most of the income gaps between the rich and poor countries. Since the small pie of differences in stock of capital ("one-quarter the stock of physical capital, three-quarter the efficiency") as the source of divergence can also be explained as differences in efficiency, assuming the inefficient countries ended up with smaller capital stocks than the efficient ones. Differences in efficiency could stem from "discrepancies in access to the latest technologies, from economies of scale, or from failures to utilize technologies effectively" (Clark 2007: 329). The problem of poor countries was not to have access to new technologies, but to use them effectively. A specific manifestation of these

inefficiencies was the employment of extra labor per machine without any corresponding gain in output per unit of capital. After observing the cotton textiles and railways around 1910, Clark concludes that although poor countries used the same technology as rich ones in order to achieve same levels of output, they employed much more labor and they lost most of their labor cost advantages.

After indicating that variation in the quality of labor as the fundamental cause of the income differences between countries, Clark investigates the question of why same differences across countries now would lead to greater divergence in income than they did in the Malthusian era. There are three reasons for this according to Clark. The first is the escape the Malthusian trap. Differences in capabilities across societies could reflect themselves to the income rather than to the population densities after the Malthusian era. The second is that modern medicine has reduced the subsistence wage in poor areas and allowed populations to rise even at incomes lower than the pre-industrial averages. The third reason is that the new production techniques have raised the wage premium for high-quality labor (Clark 2007: 365).

These differences in labor productivity must stem from differences in the quality of labor which is shaped in the local social environment. Management failures as an alternative to poor labor qualities do not explain the inefficiencies in production according to Clark. Because, first of all, managers like machines can be imported into poor countries, if it is necessary. Moreover, the experience of the Bombay industry in 1920s and 1930s shows that there is no sign of managerial failings. Problem was not outdated work norms, either. The problems in the employment of

labor were the key difficulty. Indian workers did not have qualities necessary for new production techniques. Lack of discipline, absenteeism and socially induced lethargy among workers were the main sources of inefficiencies in production (Clark 2007: 363-365).

Although there are lots of problems about Clark's arguments, perhaps the most important one is the lack of a satisfactory theory about the underlying cause of the differences in labor quality. There is not any attempt to explain why Indian workers were lazier than European workers. Clark, who already has not give priority to institutional explanations, does not even speculate on cultural factors that might be influential in creating the differences in labor quality. This deficiency leaves Clark's main argument about the source of divergence defenseless.

As opposed to Clark's claim that poor countries adopt similar technologies with rich ones, but using those technologies inefficiently, Mokyr claims that the real difference between Europe and Asia "was that the West, or at least a significant part of it, was technologically creative and managed to stay so for a longer period than any other society" (Mokyr, 1990:224). According to Mokyr, for a society to be technologically creative, there are three conditions to be satisfied. First, there has to be cadre of ingenious innovators; supply of talent must be sufficient. Second, the institutions of the society have to present right incentive structure to encourage the potential innovators. Third, there should be diversity and tolerance in society in order to overcome conservative forces against technological change. Western society seems

to have satisfied these conditions more successfully than others. Mokyr comments as:

> What made the West successful was neither capitalism, nor science, nor an historical accident such as a favorable geography. Instead, political and mental diversity combined to create an ever changing panorama of technologically creative societies. From its modest beginnings in the monasteries and rain-soaked fields and forests of Western Europe, Western technological creativity rested on two foundations: a materialistic pragmatism based on the belief that the manipulation of nature in the service of economic welfare was acceptable, indeed, commendable behavior, and the continuous competition between political units for political and economic hegemony. Upon those foundations rested the institutions and incentive structures needed for sustained technological progress (1990: 302).

Relative to other societies, Europe generated and used new knowledge with a more pragmatic attitude. Moreover, Europe was more open to new information than other societies. Islamic societies ignored the Western world largely because of religious reasons. China was too proud to imitate. However, Europeans appreciated useful knowledge regardless of the source and did not hesitate to borrow or imitate it.

The institutional background of technological progress is also important for Mokyr. A necessary but not sufficient condition for technological change is giving opportunity to successful innovators to enrich them. There might be different ways of rewarding innovation like patent systems, grants, prizes or regulations in the guilds as Epstein mentions. Regardless of how innovation is rewarded, it is important to make it attractive to invest in new technologies. Moreover, the decentralization of innovative process is equally important. Mokyr notes that “decentralized systems have tended on the whole to be more efficient than centralized ones in engendering technological progress because they did not depend on the personal judgment and

survival of single-minded and strong-willed individuals" (2002: 239). In Europe, technological change was private in nature and it took place in a decentralized and politically competitive setting. Because of this, it could be sustained in the long run despite series obstacles. However in China, the state played an important role in generating and diffusing innovations before 1400. Actually it did this successfully until fifteenth century, China developed an astonishing momentum. However, China failed to sustain its technological supremacy after this period. For some reason, by the fifteenth century Chinese state changed its attitude towards technological change. The role of imperial government in technological invention became less remarkable. Problem was that there was no private entity that could fill the place of state in promoting technological change.

Chinese lack of technological progress after 1400 is striking because it is incompatible with the path-dependent model of technological progress which is valid for the European success. Popular explanations for the Chinese backwardness which treat China as a stable, unchanging entity and claim that Chinese frame of mind was not suited to scientific and technological progress were not correct. Chinese science and technology were superior to those of the West before 1400. Mokyr underlines the fact that: "The question most in need of an answer is not why China differed from Europe, but why China in 1800 differed from China in 1300" (1990: 227).

Mokyr is in the middle ground position between two extreme positions that China's technology was backward because of 'an aversion to manipulate and exploit nature' and that there was no difference between China and West. He asserts that: "The

difference between Chinese and European civilizations was one of a degree, a degree that rose after 1400, when Europe's attitudes to the material world grew increasingly exploitative." Eastern view is more moderate compared to the aggressiveness of the West about nature. The key word that explains Chinese's relationship with nature is harmony (Needham 1975, in Mokyr 1990: 228). David Landes was among the proponents of first extreme position, seeing culture as destiny and claiming that Chinese civilization was less conducive to create necessary values for the Industrial Revolution.

According to Landes, Western Europe was already rich before the Industrial Revolution contrary to the claims of Pomeranz and Clark. Europe industrialized first, because only she was ready to industrialize in that time. Especially two particularities of Europe made European development significant and different from the rest of the world: "the scope and effectiveness of private enterprise; and the high value placed on the rational manipulation of the human and material environment" (Landes 2003: 15). Private economic enterprise had a unique role in the western development path because it was the rise of trade that solved the manorial economy and created towns. People who were dealing with occupations related to commerce, banking and industry provided the sources that the rulers and statesmen needed. Private enterprise as an instrument of power in the context of competing polities possessed a political vitality. Moreover, private enterprise was more conducive to generate innovation because the private sector was better in judging the economic opportunity. This was a self-reinforcing process; freer economies seem to have been more creative;

creativity promoted growth; and growth provided opportunities for further innovation (Landes 2003: 19).

Second particularity of Europe, the rational manipulation of environment can be decomposed to two elements, two 'deeply rooted values' of European culture; rationality and "the Faustian sense of mastery over man and things" (Landes 2003: 24). After defining rationality as the adaptation of means to ends, Landes claims that Europe was more rational in behavior than the other parts of the world already in the Middle Ages. The only evidence for this claim is the existence of population control in Europe long before industrialization and modern family planning. Moreover, according to Landes, the Calvinist ethic was an extreme example of the application of rationality to life. The Faustian ethic as a passion to rule over nature and things was the complement of the rationality. The Faustian ethic and rationality reinforced each other: mastery required adapting appropriate means to the chosen ends and the choice of right means and ends was essential for the mastery. The Scientific Revolution of the seventeenth century was very important in this sense. Landes remarks that: "Science indeed was the perfect bridge between rationality and mastery: It was the application of reason to the understanding of natural and, with time, human phenomena; and it made possible a more effective response to or manipulation of the natural and human environment" (2003: 25).

Like Mokyr, Landes thinks that European science and technology took the advantage of political fragmentation of the continent because fragmentation brought about competition. To Landes, mercantilism, 'pragmatism gilded by principle' was the

expression of the rationality principle and the Faustian spirit of mastery in the political sphere. The will to mastery, the rational approach and the competition for wealth and power broke down the resistance to technological change in Europe and "nothing-not pride, nor honor, nor authority, nor credulity-could stand in the face of these new values" (Landes 2003: 33). Therefore, Landes claims that these crucial values of European culture gave birth to the modern industrial world, that is, there were basically the cultural factors at the root of the Great Divergence.

In the explanation of the reasons that left other regions lagged behind Europe, Landes overemphasizes the role of the culture. According to him, the Chinese abandonment of westward exploration was a reflection of the values of Chinese society, more than being a result of the contingent political developments. Moreover, China failed to realize the potential of its inventions. Although almost every element usually regarded as a major contributory cause to the Industrial Revolution was also present already in there, yet China did not develop them further. For example, Chinese could easily have made an efficient spinning machine out of the primitive model described by Wang Chen, if they tried. The crucial point is that nobody tried. It was not lack of science that impeded technological progress. On the contrary, the Chinese technology stopped progressing before the point at which a lack of scientific knowledge had become an important obstacle. (That is, the problem was not the narrowness of epistemic base for the Chinese story) One of the reasons of this failure is that China lacked a free market and "institutionalized property rights". Another reason is "the larger values of the society". Chinese society was highly totalitarian. All of these created a sporadic and isolated pattern for

technological initiatives. “The result was change-in-immobility; or may be ‘immobility-in-change” (Landes 2006: 9).

In contrast with the Chinese lack of interest to technology, Landes mentions four sources of “European joy in discovery”, typically related to religious values. 1. The Judeo- Christian respect for manual labor. 2. The Judeo-Christian subordination of nature to man as a sharp departure from animistic beliefs. 3. The Judeo-Christian sense of linear time. Other societies perceived time as cyclical while Europeans perceived it as linear. Linear time may be progressive or regressive, whereas cyclical time returns to earlier stages and starting over again. 4. Role of free market (Landes 1998: 9).

The question that why China had been overtaken by the West in science and technology, despite its earlier successes is known as "The Needham Question" in the literature. Why the Industrial Revolution did not occur in China in the fourteenth century is among the most intriguing issues of comparative economic history. Many historians (i.e., Elvin 1973, Needham 1981) agree on that by the fourteenth century, China achieved a burst of technological and economic progress and reached such a level that a scientific and industrial revolution might have taken place. Despite these early advances, however, China did not take the following step. When scientific and technological progress in the West accelerated after the seventeenth century, China began to lag farther behind. Joseph Needham tries to portray this controversial situation in two questions: (i) Why was China more progressed in terms of technology and science than other civilizations, particularly western civilization, for

a long period of time until the fourteenth century? (ii) Why was China not able to sustain that advanced position thereafter? In an attempt to provide a partial explanation to the Needham Puzzle, Justin Yufi Lin (1995) analyzes several hypotheses which can be classified broadly as the explanations based on failures of demand for technology and those based on failures of supply of technology. The most widely accepted hypothesis among demand based explanations is the claim that China was in a 'high level equilibrium trap' in which the non-industrial methods were efficient enough to prevent use of industrial methods with high initial capital. According to this view the rising man-to-land ratio in China implied that labor became increasingly cheap and resources and capital increasingly expensive. Therefore, the demand for labor-saving technology declined (Lin 1995: 271).

Lin does not find demand based explanations which claim that Chinese population had grown to the point where there was no longer any need for labor-saving devices satisfactory. According to him, the fact that the Industrial Revolution failed to occur in China cannot be attributed to a lack of demand for new technology, we need to turn our attention to the supply side of technology. He asserts that the key difference between the pre-modern and modern periods is about the ways in which new technology is discovered or invented. The supply of technology comes from a process of trial and error which has two types: one is experience based and the other is experiment based. Before the Industrial Revolution technological innovations were mainly realized through accidental discoveries in production process. They basically stemmed from experience whereas in modern times, technological invention began to result from "experiment cum science". In experience-based invention process the

size of population is an important determinant because a larger population implies more trial and error and increases the rate of technological invention in a probabilistic sense. China had comparative advantage in pre-modern times because of its large population. However, it fell behind the West in modern times, because China continued to rely on experience while Europe changed its method of innovation to an experiment based process thanks to the Scientific Revolution in the seventeenth century (Lin 1995: 286). If so, the question that why a scientific revolution did not occur in China is needed to be answered. Lin attributes the reasons that China failed to have a scientific revolution to the incentive system created by the specific form of civil service examination and the criteria of promotion. That incentive system "made Chinese talents focus on Confucion classics, prevented them from accumulating human capital in other areas" (Lin 2006: 3). Diverting intelligentsia away from scientific endeavors, it decreased the probability of making a transition from primitive science to modern science.

Needham also thinks that China began losing ground to Europe in the technological race only after the Scientific Revolution occurred in Europe (Needham 1981: 122). In the search for an answer to the question that why China failed to develop modern science; he investigates the differences between Chinese and Western conceptions of time and their relations with modern science and technology. Contrary to the claims of Landes, Needham argues that although it had elements of both cyclical and linear conceptions, linearity dominated in Chinese civilization, too. Time is cyclical and eternal in the Indo-Hellenic world outlook; this temporal world is much less real than the eternal one and has not any crucial value. For the Judeo-Christian outlook, on the

other hand, time's movement is directed and meaningful. The history-consciousness of Christendom certainly contributed to the rise of modern science during the Renaissance. Moreover, the Enlightenment secularized Judeo-Christian time, deepening the belief in progress. Of course, there are different conceptualizations of time in European culture, too. But the dominant was the Judeo-Christian one, although there always have been Indio- Hellenic elements. Needham claims that Chinese situation was similar; "the culture of China was, on the whole, more of the Iranic, Judeo-Christian than of the Indio-Hellenic types" (Needham 1981: 131). Henceforth, China's attitude toward time was not responsible for the failure of China in developing modern natural science as Western Europe did.

As for the claims of Landes for Chinese failure to go further in developing existing techniques to create an Industrial Revolution, Needham accepts that the same technological improvements left the Chinese society relatively unaltered, whereas they had significant results in the European societies. Gunpowder and stirrup can be considered as the most outstanding examples. Gunpowder strongly contributed to the overthrow of military aristocratic feudalism in Europe, but it left Chinese mandarinate unaffected after five centuries of its use. Beginning of feudalism in Europe is usually attributed to invention of stirrup; still stirrup did not bring any social change to its original home, China. According to Needham, this was because scientific and technological change went on a relatively slow rate in China. Although Chinese society was self-regulating and stable, the idea of scientific and social progress and of real change of time was there. There were great forces of conservatism, but yet there was no ideological obstacle to develop modern science

and technology. It is a misconception to treat Chinese culture as static or stagnant. It is more accurate to define it as 'homoeostatic or cybernetic', because of the bureaucratic feudalism as a factor that continually tended to bring it back to its original character, after all disturbances (Needham 1981: 122).

For Needham, China and the West are antithetical in their values and social dynamics:

> China exemplified the "feminine" qualities of equity and flexibility while the West embodied a "masculine" impulse toward rigidity and certainty. Thus perhaps Europe had an inbuilt penchant for warfare as opposed to China's "inbuilt cooperation"; the built-in instability of European society must…be contrasted with homoeostatic equilibrium in China… (Needham; in Finlay 2000: 283).

According to him, the reason why the same inventions that changed Europe radically did not alter Chinese social system is that: political stability and Confucian dominance prevented the mercantile values to take place in society and because of this; an alliance between capitalism and new modes of science could not be possible. However, these technologies adopted in Europe by virtue of its political instability and merchant class and used to dominate nature and the political rivals. That is, "the European Faust seized upon the instruments of China to master over man and nature" (Finlay 2000: 288).

There are various explanations for the roots of Great Divergence by different scholars. Everyone is drawing attention to the different aspects of the same events experienced in a specific time period and writing their own history on 'Divergence'. Some of them are highlighting demographic and cultural factors; some others the

differences in technological creativity; still others geography. All of these explanations have a value in itself, but the picture still seems to be incomplete. 'Needham Question' is still a puzzle. They, all together may give a satisfactory answer to the question that why Europe and Asia have chosen different paths and reached strikingly different levels of development. Geographical good luck, perhaps cannot explain all the difference, but it explains an important advantage of Europe over Asia. The reasons that make a society technologically creative are closely related with culture. Some of the scholars mentioned before already accept that the boundaries between culture and institutions are quite blurred. It seems more useful to try to draw a complete picture, rather than insisting on decisiveness of one particular factor, being aware of the fact that this would be a big challenge.

2.5 Conclusion

'You know, Ernest, the rich are different from you and me'[8]

When American novelist Scott Fitzgerald said to Ernest Hemingway, 'You know, Ernest, the rich are different from you and me', Hemingway replied, 'Yes. They have got more money'. According to Mokyr, this answer was not exactly true. The difference between rich and poor nations is that rich nations produce more goods and services thanks to their better technologies. Even though technology cannot take all

[8] Quoted from an article of D.N. McCloskey, commenting on Clark's book, 'A Farewell to Alms'. (McCloskey 2008: 1)

the credit, there are different parts of the story like institutions, law, trade and political structures, it was the lever of riches (Mokyr 1990: vii).

The role of technology in world history has always been an interesting topic, especially if we define technology broadly enough like Braudel:

> In a way, everything is technology: not only man's most strenuous endeavors but also his patient and monotonous efforts to make a mark on the external world; not only the rapid changes we are a little too ready to label revolutions but also the slow improvements in process and tools and those innumerable actions which may have no immediate innovating significance but which are the fruit of accumulated knowledge (Braudel 1979: 334).

The important point is not to reduce superficially the relations between technology and the social system in which technology is embedded, to a linear process, to a 'simple-minded materialism'.

One of the gripping matters of both history of technology and economic history is the impact of technological innovations on society in pre-modern period. The widespread dark image of Middle Ages devoid of technological change has been challenged by various scholars. Lynn White shows that Medieval Europe witnessed crucial technological progress, addressing the effects of incremental technological innovations on the major social changes in history. Persson opposes totally to the Malthusian interpretations of pre-modern era and goes further, saying that technology is endogenous to the production process. That is to say whenever production which is the main activity of life takes place, technology shows incremental improvements. What this implies is the fact that technological progress existed in the Medieval Era and it constituted a slowly expanding foundation for the

Industrial Revolution. Mokyr, on the other hand, suggests that even though middle ages were not completely static, the relatively slow pace of technological change was because of the constraints imposed on it by narrowness of the epistemic base. It was the *Industrial Enlightenment* that changed the regime of useful knowledge and made society to overcome this bottleneck.

An important part of the picture of stagnant Middle Ages was conservative craft guilds which were blamed for their rent-seeking activities and systematic opposition to certain types of innovations. However, the impact of craft guilds on pre-modern economy and technology was more complex than this completely negative image. Alongside their useful activities such as reproducing the skilled workforce, reducing transaction costs and supplying incentives to potential innovators, they also created the institutional and organizational foundation of geographical dissemination of technology.

The different views on the technology and growth in pre-modern period naturally lead to different interpretations of the Industrial Revolution. The ones who found some sort of dynamism (technological, demographic or even biological) in pre-modern period regard Industrial Revolution as continuity rather than a structural break. Keeping in mind the difficulty of decomposing rapid and social changes in the case of social phenomena, it seems better to interpret the Industrial Revolution as a process consisting of both rapid and radical changes especially by the uses of new techniques in production process and a gradual, evolutionary transformation. Moreover, it is also important to keep in mind that Industrial Revolution was not a

completely technology-driven phenomenon. Technology may have been a necessary factor to create such a breakthrough, but it was not sufficient. Demand-driven factors were at least equally decisive in the process, both in timing and location of the Industrial Revolution.

Leaving aside several factors that may have led to the Industrial Revolution, the outcome of the Industrial Revolution was certainly a widening income gap between different societies, that is, the Great Divergence. According to Clark, 'rich are really different from others' with their special values like patience, ingenuity and hardworking. Landes also claims that the European culture was more suitable to promote economic growth but thinks that European higher culture had more ancient sources than the reproductive successes of late medieval families. Cultural differences among Eastern and Western societies certainly partake in the explanations of the Great Divergence. However, it is a rather strong argument to claim that culture is the ultimate determinant of all other things. At least, in the case of China, deep cultural values cannot explain the whole story because there was a period when China was technologically and economically superior to the West.

Moreover, global developments that gave enormous advantages to Europe should not be ignored. Europe's closeness to coal deposits and the easily exploitable Americas– even if some scholars claim that easiness in exploitation was among uniquely European abilities, too – provided Europe with natural resources and also extra breathing room for the technological improvements.

In brief, a particular factor alone, be that technological, institutional, geographical or cultural, cannot adequately explain the Industrial Revolution and the Great Divergence. All of these factors together with other historical conditions should be analyzed without sticking to old beliefs and prepositions.

In the following chapter I will examine different institutional explanations in more detail. The impact of institutions on economic growth, the institutional economists' perspectives on technology and the relationship between institutional structure and technological change will be my main focus. I will also examine how the institutional economists interpret the same historical process which prepared the rise of the West and analyze to what extent institutional and cultural explanations – often treated separately – are wedded in their analysis.

CHAPTER 3

INSTITUTIONAL PERSPECTIVES

3.1 The New Institutional Economics

The New Institutional Economics emerged in 1970s without claiming continuity with the Original (Old) Institutional Economics' line of thought; indeed it departed from the original tradition in many ways. The most widely known names of this school are Ronald Coase, Oliver Williamson, and Douglass C. North. According to this standpoint, the absence of efficient organization and adequate institutions account for the lack of technological change and economic progress in pre-industrial societies.

NIE basically tries to extend the scope of economic analysis by focusing on the social and legal norms and rules that underline economic activity. It deals with the organizational issues and considers how property-rights structure and transaction costs affect incentives and economic behavior. An institution is understood in this school as a 'system of norms with respect to particular set of activities' (Furubotn and Richer 1991: 2). Institutions are crucial to economic development because they regulate the social behavior of individual citizens.

In this section, I will first analyze *The Rise of the Western World (1973)*, which is written by Douglass North and Robert Paul Thomas, as the most outstanding example of interpreting Western economic history by adopting an institutionalist approach. Then, I will focus further on general aspects of Douglass North's

institutionalist analysis and his theory of institutional change. The place of political power in the new institutionalist analysis will be examined with a special emphasis on the studies of Daron Acemoğlu, Simon Johnson and James A. Robinson for whom the institutions are the fundamental determinants of long run economic growth. Finally, I will explore the attempt by Avner Greif to offer a unified theory of institutions, integrating different lines of institutional analyses i.e. the agency versus structural views, and the old versus new institutionalisms. This account will provide a more complete analysis about the role of institutions in economic and social history because it is based on institutional economists' their own arguments instead of discussing institutions from the perspectives of some other scholars as I have done in the previous chapter. Moreover this literature discusses the impact of institutions on economic growth directly rather than indirectly through their impact on technology as the key source of economic growth.

3.1.1 *The Rise of the Western World*

The Rise of the Western World is considered as a classic now due to its being the most complete application of the new institutional economics to the development of Western Europe. North and Thomas tried to develop an analytical framework to explain the rise of Western World – specifically unique economic growth of Europe from the 900s to the industrialization in 1750. They argue that an efficient economic organization is the key to the economic growth. They defined efficient organization as the one that "entails the establishment of institutional arrangements and property

rights that create an incentive to channel individual economic effort into activities that bring the private rate of return close to the social rate of return" (North and Thomas 1973: 1). Their analysis covers a wide time range throughout which a structure of property rights providing necessary incentives for the sustained economic growth had developed in only some parts of Western Europe, particularly in the Netherlands and England. This new property rights structure encouraged innovation and the consequent industrialization. Contrary to the claims of a large group of economic historians; according to North and Thomas, "the Industrial Revolution was not the source of modern economic growth. It was the outcome of raising the private rate of return on developing new techniques and applying them to the production process" (1973: 157).

North and Thomas criticize the economic historians because of their traditional explanations that view technological change as the major source of Western economic growth. According to them, the factors that are mostly emphasized as the sources of growth like innovation, economies of scale, education, capital accumulation are not the causes of growth; they are growth in themselves. What causes economic growth is an efficient economic organization. That is, the establishment of efficient property rights and ensuring enforcement of those property rights. The structure of property rights should make it worthwhile to undertake "socially productive activity" for economic growth to occur. There are some costs of 'creating, specifying and enacting' of property rights; however, as the potential gains of specifying property rights exceeds transaction costs, establishing them becomes worthwhile. Governments are generally more successful to establish and enforce

property rights than private voluntary groups. However, the fiscal needs of governments do not always create the property right structure that is most conducive to promote growth (North and Thomas 1973: 8). The parameters that influence the costs and benefits of establishing property rights and governments' action are critical in the analysis of this historical process.

North and Thomas's analysis is divided into two periods: 900 to 1500 A.D. and 1500 to 1700 A.D. The year 1500 is widely recognized by historians as a turning point between the medieval world and the modern world. Since many crucial changes of the fallowing two centuries were traced back to this period when expansion of the commercial world brought about significant changes in political and economic culture. Historians generally focused on a specific aspect of these crucial two centuries in their analysis whereas a "systematically cosmic look" at European history in the sixteenth and seventeenth centuries is needed. In the end of this period, some nations had been able to escape the Malthusian trap, while others failed. (they managed to escape the Malthusian trap not immediately after seventeenth century; it was in 1800s, indeed.) Holland and England were the winners; France and Spain were the 'also runs' and Italy and German were the clear losers. According to North and Thomas the differences in the performances of these economies were mainly due to their different responses to continuing fiscal crises (North and Thomas 1973: 103).

When we look at the basic economic indicators of Europe in these two centuries we see that population everywhere in Europe increased during the sixteenth century. This situation changed during the second century of the modern era. While

population in Holland and England continued to rise during the seventeenth century, populations of Italy and France stagnated and populations of the Spain and Germany actually declined. A general rise in the price level during the sixteenth century was common to those states. Relative product and factor prices changed according to population patterns. The prices of agricultural goods increased relative to the prices of manufactured goods. Land rents went up more rapidly than wages and the real wages of labor declined. In addition, the volume of trade expanded everywhere. For North and Thomas, the establishment of a regular trade between Europe and the rest of the world was among the most important achievements of the sixteenth century (1973: 113). In sum, decline in productivity in agriculture, constant productivity in manufacture and increasing productivity in transaction sector of the market characterized the sixteenth century. Economic success of the Western European countries depended on whether the increasing efficiency of the market could offset the productivity declines in agriculture due to the diminishing returns. Generally, the diminishing returns dominated over efficiency gains. And in the case of few successful countries efficiency of economic organization played an important role to overcome the productivity declines (North and Thomas 1973: 115).

British and Dutch economies had managed to increase per capita income despite the continued pressure of diminishing returns in agriculture. The rest moved in opposite direction. In the case of France, economic growth could not be sustained because the state failed to develop an efficient set of property rights. Although there were no serious drawbacks in factor markets and property rights were established in land, product market remained as imperfect as it was during the late Middle Ages because

of the state policy. State's concerns were primarily fiscal; it perpetuated guild monopolies and continued to protect the local markets to accrue revenues. As a result, gains from the transaction sector were lost because of the inefficiencies in production (North and Thomas 1973: 127). Similarly, in Spain the failure to establish secure property rights retarded development. The external sources provided Spain a ready and growing source of revenue and this fact explains both the initial rise and backwardness of Spain. Spain relied upon the foreign revenues and provided only about 10 percent of the empire's revenue even at its zenith. Its economy remained medieval "throughout its bid for political dominance". When Crown's financial difficulties increased because of the rising expenditures (especially the military expenditures); the confiscations, the alteration of contracts, and the insecurity of property rights also increased and drove people out of productive pursuits. North and Thomas underline the basic similarities between France and Spain and note that "both absolutist monarchies, caught up in a race for political dominance, failed to create a set of property rights that promoted economic efficiency. The result for their economies was stagnation" (1973: 120).

The Netherlands was the first country in Western Europe that achieved to escape the Malthusian trap. Trade and commerce were the major movers of the Dutch economy throughout the early modern period. The development of a capital market during this period was important for the rise of commerce. As a result of developing an efficient capital market, interest rate was reduced. Financial and physical capital were substituted for other productive factors in agriculture and industry. Agriculture became more capital intensive. Private property, which had already developed in

twelfth and thirteenth centuries, free labor, and market were the fundamental institutions in agriculture. As a result of these advances, the Dutch became the pioneers in new agricultural methods; “methods derived from specialization and efficient resource allocation, not invention” (North and Thomas 1973: 144). The rise of commercial activity, the development of an efficient capital market and government policy together made sustained economic growth possible for Dutch economy. Efficient capital markets, by reducing the cost of capital, made it possible to use more capital in manufacturing. Government policy, limiting the power of guilds, enabled development according to its comparative advance. So, besides the centrally located geographical position which facilitated the role of Netherland in the international trade, Dutch government contributed to the growth by establishing an efficient economic organization.

As in the case of Netherlands, the reduced cost of using the market was the main source of productivity gains in England. In agriculture, enclosures and various types of voluntary agreements eliminated the common property aspects of land ownership and increased the return of using more efficient techniques on land. In non-agricultural sectors, the relationship between the state and the private sector created the key difference for the industrial path that England took. England’s difference from France was not its intent to regulate economy, they both tried to regulate their economies but England failed to enforce the regulations. The relationship between the Crown, the parliament and the judicial system constrained the power of Crown to act independently in England. For various reasons, the efforts of the Tudors to develop a comprehensive system of industrial regulation were not effective (North

and Thomas 1973: 152). The failure of industrial regulation attempts and the declining power of guilds permitted labor mobility and innovation. Statute of Monopolies patent law further encouraged the innovation by "institutionalizing the benefits from innovation". In addition, the mobility of capital was encouraged by joint stock companies. Goldsmiths, coffee houses and the Bank of England were the new institutions that lowered the transaction costs in the capital market. The most important factor contributed to the institutional framework of England hospitable for productive activity was the supremacy of parliament. Moreover developing property rights embedded in the common law further provided the framework necessary for a judicial system to encourage productive activity.

In conclusion, the central argument of North and Thomas can be summarized very briefly as follows: The population growth between the eleventh and thirteenth centuries promoted the emergence of efficient markets in land and labor all over Europe. The population growth also led market to expand and increased efficiency required substitution of money payments for labor dues. In the process, serfdom died; labor became free and land received rent. Consequently the basic manorial relationships dissolved. However the product markets lagged behind the factor markets in this process. And this was the major cause of divergence among European countries. The countries which were able to make their product market more efficient succeeded whereas others failed to achieve sustained economic growth. Countries' performances were largely influenced by their states' policies. That is, the divergent growth paths in Europe were based on the success or failure to transform the economy to an efficient one by well-defined property rights and a well-functioning

state. The success of British and Dutch economies depended on the efficient reorganization of property rights. The failures of Spain and France, on the other hand, have been the consequence of persistence of inefficient economic organizations.

The efficiency approach to the economic institutions and property rights in the analyses of North and Thomas was challenged by various scholars. Daniel Ankarloo rightly argued that the economic system described in *The Rise of Modern World* is functionalist in an almost 'Panglossian manner'. Explanations on the basis of efficiency are used for everything and hence they explain nothing. This kind of explanations come down to saying: "The market is there because it is efficient-and if it is not there, it is because that is efficient too" (Ankarloo 1999: 9). According to Ankarloo another problem about North and Thomas's analysis is the failure in explaining the widening of the markets: An increase in market size must have necessitated certain economic preconditions about technology, production or infrastructure rather than the mere population growth as they claim. Moreover, showing the price changes as the cause for institutional change and changes in property rights is also problematic. In fact, the price changes are not only the causes; they are also the effects of institutional changes.

Sheila Ogilvie is also among the critics of the efficiency approach to institutions. Serfdom was the first pre-industrial European institution interpreted by North and Thomas, using the efficiency framework. According to North and Thomas, serfdom was an efficient solution to the existing problems in medieval economies; it was a

voluntary contract between peasants who provided labor services in exchange for the security services of lords. When the existing ratio between the labor and the land which made this contract efficient changed, serfdom disappeared. According to Ogilvie, however, the efficiency approach is not the most apt in the explanations of the institutions especially because of the presence of externalities and information asymmetries. She points out that: “An institutional arrangement could be efficient for the individuals transacting while being inefficient for society as a whole because it affects the welfare of third parties” (Ogilvie 2007: 7). According to her, there are three more feasible alternative approaches that explain the existence of institutions in terms of accidental events and personalities, cultural beliefs and values, and conflicts over the distribution of resources. A conflict approach, for instance, provides a better explanation for the long existence of serfdom. Persistence of serfdom was not because that it efficiently solved market imperfections in public goods or agricultural innovation. Rather, it created ‘an economy of privileges’ that hindered efficient resource allocation. Although serfdom was “ineffective at increasing the size of the economic pie, it was highly effective at distributing larger slices to overlords”, and this was the reason for the long existence of serfdom (Ogilvie 2007: 13). Although the conflicts approach seems to be most reasonable one, she thinks that the institutional analysis can benefit from these approaches complementarily.

Like Ogilvie, Acemoğlu, Johnson and Robinson also oppose to the claim that institutions persist because they are efficient. Existing institutions are not always the most efficient ones. Moreover, according to them it is a deficiency for North and Thomas not to specify how different parties will reach an agreement to achieve

efficient economic institutions because many economic institutions are collective choices not individual bargains (Acemoğlu, Johnson and Robinson 2004: 30).

One should note that Douglass North abandoned the efficiency view of institutions in *Structure and Change in Economic History* (North 1981) and asserted that rulers can devise property rights in their own interests and cause inefficient property rights to prevail. He also claimed that institutions evolved not because they were efficient but because they were fostered by the mental model of a particular culture. He extended his institutional analysis by using three building blocks: a theory of property rights, a theory of state and a theory of ideology. In the next sub-section I will further elaborate on Douglass North's institutional analysis about social change.

3.1.2. The Institutional Economic History of Douglass North

Before analyzing the evolution of Douglass North's intellectual adventure, I will review his interpretation of the Industrial Revolution and his ideas about the relationship between technological and institutional change. Given the fact that accumulation in the stock of knowledge has been irreversible throughout history, the rise and the decline of political and economic units must be related to their organizational structures. For this reason, North thinks that knowledge and technological advance are necessary but not sufficient for the economic success. The stock of knowledge and the stock of technology only set upper bounds to human well being; the structure of political and economic organization determines the

performances of economies within those upper bounds. The organizational structure also determines the rate of growth in knowledge and technology.

North believes that human history develops in a continuous and evolutionary manner. He downplays the revolutionary aspect of industrialization as contending that the Industrial Revolution "was not the radical break with the past that we sometimes believe it to have been" (1981: 162). Moreover, the technology of the Industrial Revolution followed rather than preceded the structural changes in the economy since according to him: "the technological change associated with the Industrial Revolution required the prior development of a set of property rights, which raised the private return on invention and innovation" (1981: 147). He defines the Industrial Revolution as "an acceleration in the rate of innovation" but the origins of this acceleration go back well before the traditional chronology (1750-1830). As North and Thomas mentioned before, the rise of parliament in England caused the structure of property rights to diverge from the continental pattern. Better specified property rights improved factor and product markets and increased the market size. Growth in the size of the market induced greater specialization and the division of labor and increased the transaction costs. In order to reduce those transaction costs, an alteration in economic organization was necessitated. Besides reducing the transaction costs, the organizational change lowered the cost of innovating. The increased market size and the better specified property rights over invention further encouraged the technological change by raising the rate of return on innovation and accelerated economic growth. That is, the interrelated process of organizational change and technological development made up the Industrial Revolution. Moreover,

all of these developments paved the way for “the real revolution in technology-the Second Economic Revolution-which was the wedding of science and technology” (North 1981: 159).

According to North, the Industrial Revolution at the time was the result of organizational changes to improve the monitoring of workers. The factory system and Industrial Revolution were the parts of a series of small technical changes and a gradually developed system of work-monitoring. Besides work-monitoring, the factory discipline had some additional consequences of suggesting new productive combinations, techniques and substituting machines for human hands. North thinks that the traditional interpretations of the Industrial Revolution are based on wrong way causality – “that is from technological change to the factory system; rather than from central workplace, to supervision, to greater specialization, to better measurement of input contributions, to technical change” (1981: 169).

Institutionalization of technological change during the nineteenth century which North calls the Second Economic Revolution was more dramatic than these developments. Second Economic Revolution was more than a clustering of a set of innovations; rather it created ‘an elastic supply curve of new knowledge’. The steps in the development of the Second Economic Revolution were:

1. the development of the scientific disciplines
2. increasing intellectual interchange between scientists and inventors during the Industrial Revolution which resulted in increasing investment in human capital and creation of an invention industry

3. the evolution of property rights which raised the private rate of return closer to the social rate of return (North 1981: 173).

As it was already mentioned before, technology provides the upper bound of economic growth in the theoretical framework of North, whether potential of the economy can be realized or not, depends on the incentive structure, that is, the institutions of society. North considers the institutional change as an important and independent source of growth, rather than viewing it a way of implementing technological change. But he also accepts the importance of technological change reporting that: "technical change also has a broader impact, sometimes changing transformation costs, but sometimes changing transaction costs more directly" (North and Wallis 1994: 610-611). Institutions and technology concomitantly determine transaction and transformation costs in the economy and by this way they determine profitability of engaging in economic activity.

North defines "institutions" as "the humanly devised constraints that shape human interaction" (1990: 3). He views them as responses to changing transaction costs within the economy. He defines the transaction cost as: "…the costs of defining, protecting, and enforcing property rights…" (1990: 28).[9] North later, made a distinction between institutions and organizations when he is trying to complete his analysis about the persistence of inefficient institutions in societies and the responsibility of rulers for this, which he started in *Structure and Change in Economic History* (1981). Institutions are the rules of game whereas organizations

[9] Transaction costs are defined for the first time in North and Thomas (1973) as consisting of *search costs, negotiation costs* and *enforcement costs*. (1973: 93)

are the players in the game. According to North: “It is the interaction between institutions and organizations that shapes the institutional evolution of an economy” (1990: 7). Institutions consist of both informal constraints such as sanctions, taboos, customs, traditions, and codes of conduct, and formal rules such as constitutions, laws, property rights (North 1991: 97). Informal constraints originate from ‘the cultural transmission of values’, from ‘the application of formal rules to solve specific exchange problems’ and from ‘the solutions to coordination problems’. Together with the traditional constraints (budget, technology) of economic theory, institutions determine the opportunity set in the economy and this opportunity set, in North’s words, determines “what kind of purposive organizations (firms, trade unions, farm groups, political bodies) will find it worthwhile (given wealth maximizing or other objectives of the organization) to come into existence” (1993: 243).

Both the sources and the rates of change are different for formal rules and informal constraints. Formal rules can be altered by deliberate political or judicial action whereas informal constraints cannot immediately be adopted to those changes. Because of this, institutional change is overwhelmingly incremental. The revolutionary changes are “seldom as revolutionary as they appear”, because of the inconsistency between new formal rules and persistent informal constraints (North 1993: 257). North thinks that the rise of England can substantially be attributed to the triumph of parliament. Although he is not certain about the role that informal constraints played in the events of the seventeenth century, he believes that it is plausible to assume that underlying informal constraints were hospitable to the

alteration of formal rules. This means that English social attitudes and norms have been strikingly different from those of the Continent (North 1990: 140). He mentions Alan Macfarlane's book on *The Origins of English Individualism (1978).* Although it is not clear if North agrees with Macfarlane's main thesis who claims that England was very unique in comparison to the rest of Europe, because of its individualism, he certainly finds it worth to mention. According to this view, England's difference went way back in time: At least from the thirteenth century onwards, England was different from peasant societies because of the absence of traditional features like patriarchal domination, self-sufficiency, and extended family. North mentions this as a justification of the importance of part-dependency in history (1990: 115).

In North's theoretical framework, the informal constraints and 'the mental models inherent in individuals and societies' are the main reasons for path dependence. The constraints derived from the past determine the path of institutional change and hence the long run evolution of societies. Institutions, both the formal rules and the informal constraints, transform belief structures into social and economic structures. According to North, there is an intimate relationship between mental models and institutions. He elaborates this as follows: "Mental models are the internal representations that individual cognitive systems create to interpret the environment; institutions are the external (to the mind) mechanisms individuals create to structure and order the environment" (North 1994: 363).

Western world is an exception according to North in the sense that property rights provided the incentives to reach "pure knowledge" there, different from other

economies of the world. The links between institutional structure, belief systems and the incentives to acquire pure knowledge are important since North maintains, "a major factor in the development of Western Europe was the gradual perception of the utility of research in pure science" (1994: 364). Besides the monetary rewards and punishments, the incentives to acquire pure knowledge are also affected by a society's tolerance and creative development. He designates what lies behind the success of Europe as follows:

> The remarkable development of Western Europe from relative backwardness in the 10th century to world economic hegemony by the 18th century is a story of a gradually evolving belief system in the context of competition among fragmented political/economic units producing economic institutions and political structure that produced modern economic growth" (1994: 365).

And even within the Western Europe there were successes (the Netherlands and England) and failures (Spain and Portugal) because of choosing different institutional paths as North and Thomas explained in *The Rise of the West.* By the recent emphasis on belief systems and mental models, North abandoned his original emphasis on efficiency and came closer to cultural explanations. He explained the evolution of institutions not by their efficiency but by the fact that they fostered by the mental model of a particular culture.

There are several critiques of North. For instance, according to Hodgson, definition of institutions as constraints ignores their enabling roles. Institutions both constrain and enable behavior. The existence of rules implies constraints; however some constraints open up possibilities. For example: the rules of language enable to

communicate or the rule of law increase personal safety. Moreover, Hodgson has some doubts on the distinction that North makes between organizations and institutions. First of all, Hodgson believes that North ignores the potential conflict within the organization when saying that organizations "are made up groups of individuals bound together by some common purpose". Second, North is not clear enough about 'defining organizations as players' or 'regarding organizations as players as an analytical abstraction'. This creates confusion and leads some people to think that organizations are not institutions, which is not true (Hodgson 2006: 8-13).

Furthermore, institutions are not only 'humanly devised constraints', external to the individual as North implies when he writes that: "mental models are the internal representations that individual systems create to interpret the environment; institutions are the external (to the mind) mechanisms individuals create to interpret and order the environment the environment" (North 1994: 362). According to Ankarloo, "mental models" would be impossible without institutions: "It would not be possible for man to "represent and interpret" the environment without institutions like culture and habit" (1999: 13). Finally, because North's description of power and state is highly consensual, there is very little room for social conflict and antagonistic social relations in his analysis. However, as Ankarloo points out that power itself is based on property relations that are very antagonistic indeed. The role of power and political institutions in long-run economic growth will be the topic of next section, particularly with special emphasis on the review of Acemoğlu, Johnson and Robinson's study.

3.1.3. The Role of Political Power in the New Institutional Analysis

Acemoğlu, Johnson and Robinson argue that differences in economic institutions are the fundamental cause of differences in economic development. Economic institutions shape economic outcomes determining the incentives and the constraints on economic actors. However economic institutions reflect social choices that are in general in conflict and the conflicts are resolved in favor of the groups who have political power. Accordingly, Acemoğlu, Johnson and Robinson give a central place to the political institutions that determine the distribution of political power in society in their theoretical framework. Actually, in their view, if there is a hierarchy between institutions, political institutions must be at the top of the hierarchy. The political institutions and the distribution of resources are the state variables in their analysis. They explain the emergence of economic institutions causing economic growth as follows:

> Economic institutions encouraging economic growth emerge when political institutions allocate power to groups with interests in broad-based property rights enforcement, when they create effective constraints on power holders, and when there are relatively few rents to be captured by power-holders (Acemoğlu et al. 2004: 2).

Basic arguments of Acemoğlu, Johnson and Robinson can be summarized as:

1. Economic institutions, shaping the incentive structure in society influence investment decisions on physical and human capital and technology. So they influence the organization of production. In this way, they determine the growth potential of the economy. Moreover they influence distribution of

resources in the future. Although cultural and geographical factors have some impact on the performances of economies, differences in economic institutions are the major determinants of the differences in the growth rates.

2. Economic institutions are endogenous in the sense that they are partially determined by society or a segment of society. They were results of the collective choices of society. And political power is the ultimate determinant of those choices.
3. Exercise of political power may lead to economic inefficiencies because the use of political power creates commitment problems. And commitment problems make distribution and efficiency issues inseparable.
4. The distribution of political power in society is also endogenous. There are two components of political power: *de jure (institutional)* and *de facto political power*. De jure political power originates from the political institutions. For instance, in a monarchy, all de jure political power is assigned to the monarch.
5. De facto political power does not originate from political institutions. A group of individuals may possess political power. Their power has two sources: ability of the group to solve its collective action problem and economic resources of the group.
6. Political institutions and the distribution of resources are the state variables in this system. They change relatively slowly and determine economic performance both directly (through the creation of economic institutions

which determine property rights structure) and indirectly (through the distribution of de jure political power) (Acemoğlu et al. 2004: 2-5).

They explain the development of property rights in Europe in this framework. Political institutions in the Middle Ages gave all political power to the kings and monarchs. Monarchs protected only their own property rights because there was not any incentive to protect others' rights. Consequently, economic institutions failed to encourage investments in land, physical/human capital and technology; so they failed to promote growth. By the seventeenth century, however, the increase in Atlantic trade and developments in the English land market gradually increased the de facto power of merchants and landowners. These groups had interests in conflict with those of the kings; they were trying to reinforce their property rights whereas the kings were trying to increase their tax incomes. The merchants and gentry's de facto power overcame the Stuart monarchs in the Civil War and the Glorious Revolution and enabled them to change the political institutions. Change in the distribution of power created new economic institutions and strengthened the property rights of land and capital owners. The result was financial and commercial expansion, increase in productive activity and "the rapid economic growth, culminated in the Industrial Revolution" (Acemoğlu et al. 2004: 7).

According to Acemoğlu, Johnson and Robinson standard economic models of factor accumulation and endogenous technological change only provide partial and deficient explanations of different growth performances of the countries. There are some other fundamental explanations of the divergence. They analyze basically three

theories which respectively focus on institutions, geography and culture (they report that there might be a fourth theory which focuses on “luck”). Differences in economic institutions appear to be most important factor underlying the differences in income per capita across countries. There is an empirical support of this claim. They use an econometric analysis which searches for a relationship between GDP per capita and “protection against the appropriation risk” as the broad measure of property rights. This analysis shows that the countries with more secure property rights have higher average incomes. However the authors are not satisfied with this analysis because there might be some problems like the existence of reverse causation or omitted variable bias. Thus, they investigate the underlying reasons of the North and South Korea’s different economic performances as a “natural experiment”.

South and North Korea organized themselves in completely different ways and adopted different set of institutions after separation following the Second World War. The North tried to establish a socialist society and abolished private property of land and capital. The South, on the other hand, maintained a system of private property and government. Before the separation and emergence of this big institutional diversification, North and South Korea shared the same history and cultural roots. Acemoğlu, Johnson and Robinson emphasize the homogeneity that the country exhibited before separation by saying that: “In fact, Korea exhibited an unparalleled degree of ethnic, linguistic, cultural, geographic and economic homogeneity. There are few geographic distinctions between the North and South, and they both share the same disease environment” (2004: 18). The fact that two

Koreas have experienced strikingly different development paths proves the claim that institutional differences are the underlying causes of different economic performances according to them. South Korea has exhibited an impressive economic development and became one of the Asian miracle economies by the late 1960s whereas North Korea stagnated. Sharing the same geography and culture weakens the explanatory powers of other explanations and leaves only the institutional explanations plausible for the radically different economic experiences.[10]

In the search for an answer to the question of 'why institutions differ among societies' Acemoğlu, Johnson and Robinson discuss four main approaches: the efficient institutions view, the ideological view, the incidental institutions view and the social conflict view. The efficient institutions view is restricted because it regards the structure of political institutions and power irrelevant. According to this view, power is relevant for the distribution of total surplus; and not relevant for the efficiency. However, according to Acemoğlu, Johnson and Robinson, like Ogilvie, efficiency and distribution issues are inseparable. Moreover, efficiency view fails to explain the persistence of inefficient institutions. The authors do not overlook the

[10] For those who think that this is an extreme case as a natural experiment because this comparison is based on the difference between a market-oriented economy and a communist economy, Acemoğlu, Johnson and Robinson analyze another example, the colonial experiment. British cultural beliefs created quite different economic institutions in different colonies. In densely settled colonies such as India and the Caribbean, British culture created oppressive economic institutions which worked for the extraction of resources from the indigenous population. In sparsely populated areas such as the northern United States, Canada and New Zealand, British culture created beneficent economic institutions that protected property rights, and encouraged investment. Europeans consciously created different economic institutions because the conditions and endowments of colonies were different. The same British beliefs and values existed together with different institutional rules and led to divergent economic performances. Hence, the evidence from colonial experiment "is not consistent with a major role of geography, religion or culture transmitted by the identity of the colonizer or the presence of Europeans. Instead, differences in economic institutions appear to be the robust casual factor underlying the differences in income per capita across countries." (Acemoğlu et all. 2004: 29) (See also Acemoğlu et all. 2001, 2002)

fact that differences in belief systems and ideologies play important roles in the development of societies. However they do not think that a satisfactory theory explaining the divergence among countries can be built only on differences in the ideologies. Hence, only the social conflict view coincides with the approaches of Acemoğlu, Johnson and Robinson. They reveal the differences of social conflict view from other views which make it more powerful as follows:

> In stark contrast to the efficient institution view, political institutions play a crucial role in the social conflict view…What distinguishes the social conflict view from the ideological view is that social conflict can lead to choices of economic institutions which cause underdevelopment even when all agents have common knowledge that this is so. What distinguishes it from the incidental view is that it emphasizes that institutional choices which cause underdevelopment are conscious choices, rather than the result of some historical accident (2004: 37).

After defining "good economic institutions" as "those that provide security of property rights and relatively equal access to economic resources to a broad cross-section of society", they distinguish the preconditions for the emergence and persistence of good economic institutions in a society (Acemoğlu et. all: 9). Firstly, political institutions should place checks on the holders of political power; they should create a balance of power in society. Second, political power should be in the hands of a relatively broad group who has important investment opportunities. Finally, the rents that power holders can extract from the rest of society should be limited (Acemoğlu et al. 2004: 10).

To conclude, for Acemoğlu, Johnson and Robinson, economic institutions are the underlying determinants of economic performance shaping the incentive structure of

society and determining the constraints on economic actors. The social conflict view presents the best explanation for the existence of particular institutions according to them. Because of this, they pay a special attention to the role of political power in their analysis and try to explain the dynamics of change in political institutions besides economic institutions.

3.1.3 An Attempt of Synthesis: Avner Greif

Avner Greif, in *Institutions and the Path to the Modern Economy* (2006), combines historical research and a game-theoretical analysis[11] with the intention of offering a unified theory of institutions. For Greif, institutions are 'the engine of history'; they shape historical developments of societies; influence behaviors; affect the timing and nature of behavioral changes and affect the new institutions (2006: 400). He analyzes the institutional foundations of medieval period and the role of this institutional heritage in the Rise of the West. According to him, different lines of institutional approaches should be integrated in order to advance the institutional analysis. There are various approaches which define institutions as rules or equilibria, rules of game or beliefs and norms; which adopt the agency perspective or structural perspective. They all capture a different, yet important aspect of reality; but an 'all-encompassing

[11] In the face of the reservations of institutional economists about using game theory, Greif admits that game theory does not provide a theory of institutions. He studies institutions as equilibrium phenomena, but he does not consider games or institutions as the basic unit of his institutional analysis; rather he view "transaction" as the basic unit of analysis. Although he is aware of the limitations of a game-theoretical analysis, he still thinks that it is analytically and empirically useful (Greif 2006: 18).

approach' is needed. Greif asserts that he presents a new perspective and calls his approach as "comparative and historical institutional analysis" (2006: 14). This approach differs from dominant institutional analysis in two ways: First, it does not define institution as a monolithic entity; it recognizes them as composed of interrelated but distinct components, rules, beliefs, norms and organizations. Second, it combines the structural view which asserts that institutions structure human interaction, mold individuals, and constitute the social and cultural world in which they interact and agency view which emphasizes individuals as the creators of institutions (Greif 2006: 14).

For Greif, debating on whether culture or institutions is more important in the explanation of a particular phenomenon or discussing the definitions of culture and institutions is not meaningful because the cultural and institutional explanations both are interested in same phenomena: "the implications of man-made, nonphysical factors that generate regularities of behavior" such as belief systems and internalized norms. (2006: 21) Therefore, he is interested in the extent and the conditions under which the cultural and institutional explanations overlap. He defines an institution as "a system of social factors (a system of rules, beliefs, norms and organizations) that conjointly generate a regularity of behavior". (2006: 30) This definition includes regarding institutions as the rules of the game in a society; as formal and informal organizations; as beliefs about others' behavior or about world; as internalized norms of behavior; and as regularities of behavior. According to him, for rules to gain the character of institutions, individuals must be motivated to follow those rules. Behavior is guided by rules and motivated by beliefs and norms. Organizations,

according to this definition, also constitute institutions. They have "three interrelated roles: to produce and disseminate rules, to perpetuate beliefs and norms, and to influence behavioral beliefs" (Greif 2006: 37-39). He criticizes Douglass North's 'institutions-as-rules' approach by asserting that in North's analysis why people follow rules is exogenous to the analysis. This is erroneous since motivation cannot be considered as exogenous. According to him, it is needed to be explained why some rules are followed and others are not. This explanation, in turn, necessitates the analysis of motivations.

Greif considers the scholars that rely on exogenous factors to explain the Rise of the West as culpable of technological, environmental or cultural determinism. In order to claim that the Rise of West is due to predetermined factors such as closeness to coal deposits, ports suitable for trade or later events such as colonialism and the Industrial Revolution, one should demonstrate that the implications of these exogenous factors were not the reflections of institutional specialties of Europe (Greif 2006: 399). He also opposes to Pomeranz's argument that 'divergence' is a modern phenomenon, beginning in 1800s. He claims that the West developed peculiar institutions as early as the late medieval period and searches for the possible contributions of late medieval period's institutional heritage to the Rise of the West. He analyses the institutions of European and Muslim worlds comparatively during the late medieval expansion. Based on this analysis, he claims that many of the elements of modern Western style institutions were already present or emerging during the late medieval period: "individualism, man-made formal law, corporatism, self-governance, and

rules reflecting an institutionalized process in which those who were subject to them had a voice and influence" (Greif 2006: 379).

Greif thinks that the trade expansion of the late medieval period was a fundamental transformation evoked by the institutional innovations which had provided the foundations for markets and political units; played an important role in initiating trade rather than the demography, technological innovation, or any other non-institutional forces. In agreement with Robert Lopez in his claim that the commercial revolution for the years 950–1350 was the driving force of economic progress, Greif regards this transformation as revolutionary as the Industrial Revolution. And he claims that the Rise of the West began with the growth of European commerce in the late medieval period (Greif 2006: 23–24). In his analysis of medieval commercial expansion, Greif draws attention to two points. Firstly, contrary to North's assertion that market expansion and economic development require an effective state, the foundations of the commercial expansion did not depend on the enforcement by a central state. Private-order, self-enforcing institutions were characterizing the period. Second, historically kin-based social structures like lineages or tribes substituted for an effective state. However, in the case of late medieval Europe, the prevailing social structures were 'self-governed', 'interest based'; and they were established among individuals unrelated by blood (Greif 2006: 388-389). This peculiarity of Europe was the reflection of various institutional elements inherited from the past. The cultural beliefs and norms associated with individualism and corporatism were the hallmark of institutions that supported the late medieval commercial expansion. Church contributed to the rise of cultural beliefs at issue. In Greif's own words:

> The church had weakened kin-based social structures (such as clans and tribes) in Europe and contributed to cultural beliefs associated with individualism. This hindered the establishment of institutions based on large-scale, kin-based social structures and collectivist cultural beliefs (2006: 390).

Maghribi traders' coalition is among the specific institutions that Greif analyzes. He compares Maghribis and Genoese in order to understand relationship between cultural beliefs and organization of society which in turn would explain divergent institutional trajectories. Maghribis had 'collectivist' cultural beliefs contrary to the 'individualistic' culture of Genoese. Although they faced the same technology and the same commercial opportunities, the two groups adopted widely different solutions to the problem of contract enforcement. The collectivist cultural beliefs of the Maghribis gave rise to institutions based on the group's ability to use social and moral sanctions against deviants and provided collective enforcement. Conversely, the individualistic cultural beliefs of the Genoese gave rise to institutions based on legal organizations for enforcement. Each system has different efficiency implications.

Greif asserts that there are resemblances between on one hand the Maghribis' institutions and those of the contemporary underdeveloped countries; and on the other hand between the Genoese institutions and those of the developed west. Hence, he thinks that in the long run individualistic systems may have been more efficient. He speculates on the possible long-run benefits of individualistic systems as such:

> To the extent that the division of labor is a necessary condition for long-run, sustained economic growth, formal enforcement institutions that support anonymous exchange facilitate economic development. Individualistic cultural beliefs foster the development of such institutions, enabling society

> to capture these efficiency gains. Similarly economic prosperity requires institutions that led to socially beneficent policies and the specification, protection and adjustments of property rights. Individualism, corporatism and self-governance on the level of polity foster the development of such institution. Third; an individualist society entails less social pressure to conform to social norms of behaviors while the corporations are better able to mobilize resources and diversify risk. Finally, intentional institutions centered around corporations foster beneficial institutional dynamics (Greif 2006: 398).

Greif does not give an exact answer to the question of whether the seeds of the Rise of The West have been cultivated by late medieval society. However he thinks that there are important resemblances between the economic and political institutions of late medieval period and those of the modern economies. In modern economies the cultural beliefs and the norms associated with individualism prevailed; predominating social structure is self-governing cooperation like the self-governing social structures of late medieval period; and the basic social unit in is the individual or the nuclear family instead of kin-based social structures like clans or tribes.

Gregory Clark criticizes Greif's arguments about the role of trade in the economic expansion of medieval period. It is true that in the years between 950 and 1350, Western Europe witnessed population growth, urbanization and a growth in the volume of long distance trade. But the causes of these changes are difficult to disentangle: Demographic change, improvements in agricultural productivity and/or improvements in industrial productivity could be among the underlying reasons. So, it is hard to know whether trade was a driving force as Greif assumes or it was a response to the technological or organizational changes (Clark 2007: 733).

Moreover, although Clark finds Greif's account of community responsibility system interesting he thinks that its relation to the eventual domination of the West is not sufficiently explored. He reports that: "by the thirteenth century, after all, when the Islamic world was still a vigorous competitor of Christian Europe, the community responsibility system disappeared." Because of this, the role of community responsibility system in the Rise of the West is "tangential" according to him (2007: 732).

There are also some criticisms about Greif's method, especially on his utilization of standard game theoretical analysis. According to Emrah Aydınonat, lack of an analysis the origins of institutions is an important deficiency. Greif does not find it necessary to discuss about origins of institutions. However, without the analysis of origins it does not seem possible to study the dynamics of institutional change. This deficiency is a result of using standard game theoretical analysis based on equilibrium analysis. Standard game theory is only appropriate for studying self-enforcing nature of institutions, not their origins. Using evolutionary game theory might have been more useful, but Greif finds assumptions of evolutionary models about human nature unrealistic (Aydınonat 2006: 157). Indeed, which model's assumptions are more unrealistic is debatable: bounded rationality assumption (assuming that individuals are "completely myopic" with the words of Greif) of evolutionary models or full rationality and complete information assumptions of standard models (Greif 2006: 12). By using evolutionary game theoretical models, Greif would have included "old institutionalism" to the analysis and this might have

justified partially the initial claims of Greif to combine various institutional approaches.

There are still some other criticisms. According to Ogilvie, for instance, although Greif denies subscribing to an efficiency view of institutions in general, for the specific institutions he selects to study- the Maghribi traders' coalition, the European merchant guild, the Genoese *podestreia*- he thinks that they have been efficient in facilitating medieval commerce. Ogilvie calls Greif's approach as 'cultural efficiency approach' because "it reduces the problem of explaining institutions to one that can be addressed through an efficiency model with cultural beliefs and values thrown in as 'motivation'. …Cultures that hold the 'right' beliefs arrive at the right institutional equilibrium and therefore prosper" (2007: 24). There are at least two major problems about cultural efficiency approach: 1. inwardly held beliefs, values, norms, and mental models are not easy to observe and study, 2. there is a danger in using arbitrary definitions of some cultures as holding beliefs and values that are economically good like Protestant diligence, English individualism, and European rationality. It has to be considered that any culture is a mixture before assuming one culture is absolutely good or conducive to economic growth (Ogilvie 2007: 24-25).

Mokyr, on the other hand, finds the range of institutions that Greif deals with narrow and his work far away from presenting a general theory of economic institutions although he accepts the profundity of Greif's analysis about the issues he is concerned with. Mokyr has some doubts about the applicability of Greif's 'historical and comparative institutional analysis' to such issues as "corruption, despotism,

representative political institutions, altruism and poor relief, trade associations, marriage contracts, families as allocation mechanisms, intergenerational contracting, personal feudal relations, the emergence of universal banking and so on" (Mokyr 2005: 200).

Despite the existence of various criticisms for different parts of Greif's analysis, it is acknowledged by almost all of these critics that Greif's study is rich and made valuable contributions to institutional economics and his approach to history and institutions is novel and mind opening. It is also my contention that Greif's study marks the pinnacle of NIE's approach to institutions and their role and place in society.

* * *

The literature discussed in the second chapter refers only to the studies of new institutional economists that I had mentioned in passing in the first part of this chapter. The scholars aforementioned in the second chapter criticize or accept and include those new institutional analyses to their studies. The discussion about institutions and their importance in this literature is precluded by a vision that only focuses on property rights, enforcement mechanisms of those property rights, the existence of transaction costs and the efficiency of markets. Needless to say, these issues are important in the institutional analysis. However, incorporating old institutional analysis into this picture may give us a chance to elaborate this literature under a new light. It is a promising task for one reason that defining institutions more broadly like the "habits of thoughts", as OIE does, may amalgamate the approaches

discussed separately before as cultural and institutional explanations. In the second half of this chapter I will examine the old institutional economic analysis and its potential contributions to the literature discussed.

3.2 The Original (Old) Institutional Economics

The Original Institutional Economics can be traced back to the beginning of the twentieth century. The founders of institutionalism were Thorstein B. Veblen, Wesley C. Mitchell and John R. Commons. OIE views the whole economy as an institutionalized process instead of focusing on particular institutions. As discussed in the first section, most of the NIE theorists' view is that institutions exist because they improve efficiency. They are more broadly defined as a means to reduce transaction and information costs. The functionalist character of this position is irreconcilable with the analysis of OIE. In fact, the representatives of these two approaches, OIE and NIE, do have critiques of one another. The new institutionalists criticize the old institutionalists for their lack of theory, their tendency to argue in holistic terms rather than in individualistic terms, and their use of a "behaviouristic" rather than a rational choice framework. The original institutionalists, on the other hand, make the opposite set of claims against the new; they regard NIE as more formalist (particularly in its neoclassical and game theoretic manifestations), individualist, reductionist, orientated toward rational choice and economizing models, and generally anti-interventionist (Rutherford 1994: 4). Let us now examine the main points of divergence among NIE and OIE.

Defining them as man-made formal rules and informal constraints that structure the social interaction, NIE views institutions basically as constraints. It claims that people build institutions ignoring the fact that human action is shaped by institutions in return. On the other hand, in OIE, there are various definitions of institutions. Hamilton, stressing their permanent structures, associates an institution with a "way of thought or action of some prevalence and permanence which is embedded in the habits of a group or the customs of people" (Hamilton 1932: 235). Wesley C. Mitchell remarks, "'Institutions' is merely convenient term for the more important among the widely prevalent, highly standardized social habits" (Mitchell 1950; in Neale 1987: 1178). According to Commons, institutions may be defined as "Collective Action in Control of Individual Action" (Commons 1934; in Neale 1987: 1178). Veblen defined them as "settled habits of thought common to the generality of man" (1919; in Hodgson 1988: 125). Hodgson attempted to make a synthesizing definition which emphasizes the common points in the OIE and defined them as "systems of established and prevalent social rules that structure social interactions" (Hodgson, 2006: 2). These definitions regard institutions not only constraining; they see them also enabling. Moreover they take into account institutions' role in inculcating certain behavioral norms and frames of mind upon individuals.

OIE's approach to property rights is also quite different from that of NIE for which the single most important institution is property rights. For OIE, property rights are more than just legal entities. They are operational only in relation with other customary institutions. They are dependent on the customs and social norms. Making them effective requires more than simply setting up the "legal" property rights

institutions and their enforcement mechanisms. Furthermore, stronger property rights are not always conducive to economic development contrary to the general claims of NIE. The property rights that protect obsolete technologies or pecuniary gains of owners of the industrial plant at the expense of industrial efficiency are socially counter-productive and sabotage the economic development.

Both approaches, NIE and OIE, are inclined to interpret historical process as evolutionary. However, there are important differences among their theory of social and institutional change. Veblen who views economy as a "processual paradigm" (Özveren 1998: 504) and sees the evolution as the dominant trend, opposes to the equilibrium analysis of orthodox economics. He analyzes social change consisting of cumulative sequences involves some phases as follows: Habits give rise to institutions. The prevailing institutional scheme affects the rate and the direction of technological change. New technologies introduce new adjustments to the existing institutional structure. A possibility of change in institutional base emerges as a result of new habits of thought which come forward as technological change overcomes the resistance of existing institutions. He endogenizes technology indicating that technology transformes the institutional structure, but it is also effected by that structure by way of both the classical channels (determining pace and direction of technological change) and the habits of thoughts maintained by that institutional structure. One of the most important implications of such an analysis for the previous discussions is that we do not have to assign different and separate roles to technology and institutions in history and decide which one was more decisive in shaping significant developments of world history like the Industrial Revolution and the

resulting Great Divergence. Because the evolutions of technology and institutional structure are intertwined. This approach does not contradict with the traditional explanations heralding technological change as the major source of Western economic growth that the new institutional economists oppose to. Nor does it need to prove that change in institutional structure as a more decisive factor preceded the major technological changes in history. Because OIE analyzes the social and economic change as an institutionalized process rather than focusing solely on particular institutions' roles in social change.

Another major difference of OIE from NIE is about their methodologies. NIE has a methodologically individualistic approach. As a result it has a tendency to explain technological and social change starting from individual. And because it does not fully reject the hedonistic conception of man, the utilitarian aims of individual remains starting point of any analysis about social change. When this methodology is applied to the history of Western world, it leads to conclude that the most important requirement of technological change is establishing the right incentive structure that increases the private rate of return to innovation. Thus, technological progress seems to be a result of the creativity of individual who tries to maximize his private gain in this analysis. On the other hand, OIE views technological progress as a community work. While rejecting the hedonistic conception of man and explaining human behavior on the basis of completely different premises as I will explain in the following pages, Veblen sees the technological change as a by-product of human activity that is inclined to useful effort, although he thinks that the instinct of workmanship is contaminated by pecuniary valuation in modern era.

After this brief introduction to the general hallmarks of the old institutional economic analysis, in the following subsections the role of technology in the OIE's analysis of social change will be examined. This part is primarily based on the theoretical framework developed by Thorstein Veblen who 'provided much of the intellectual inspiration for institutionalism' (Rutherford 2001: 174). Then the evolution of Western Civilization and its peculiar development path will be discussed. The case of England in comparison with other continental countries, the Industrial Revolution and its impact on differentiation of England from others will be analyzed from the perspective of OIE.

3.2.1 Technology and Social Change in Veblen's Analysis

In order to understand the underlying determinants of social change, Veblen first focuses on the factors that shape human behavior. Instincts are the 'prime movers' in human behavior according to him. Together with the material environment of the community, they generate the prevalent institutional structure. He reports that: "A genetic inquiry into institutions will address itself to the growth of habits and conventions, as conditioned by the material environment and by the innate and persistent propensities of human nature" (Veblen 1964[1914]: 1-2). Habitual elements of life change 'unremittingly and cumulatively' and bring forth continued growth of institutions. Changes in the institutional structure occur in response to 'the altered discipline of life' under changing cultural conditions (Veblen 1946[1914]: 18). Since human nature remains same and instincts are persistent as 'innate

propensities of human nature', in order to understand the institutional change he tries to reveal the dynamic factors that change the material framework. According to him, the most important dynamic factor of institutional change is technical action of human beings. Thus, technology is central to his analysis. However he defines technology more broadly something like a knowledge system. "The state of industrial arts" in his writings refers to technology and it consists of the common technological knowledge of society. It is a 'fact of group life', not of private initiative or private innovation. It is a common social heritage of the past; in Veblen's words:

> In the main, the state of the industrial arts is always a heritage of the past; it is always in process of change, perhaps, but the substantial body of its knowledge that has come down from earlier generations. New elements of insight and proficiency are continually being added and worked into this common stock by the experience and initiative of the current generation, but such novel elements are always and everywhere slight and inconsequential in comparison with the body of technology that has been carried over from the past (Veblen 1964[1914]: 103).

In a similar vein with Veblen's definition, Ayres defines technology as 'organized skill' (1962[1944]: 105). The relations between skills and tools are important to understand technology as a function of human behavior. Technical activity can only be identified by its association with tools. The developmental character of technology is "implicit in the character of tools" not in the technical skills of individual according to him. Because of this, technological progress should be analyzed on the level of culture which has a communal character rather than individual creativity.

The technical action of men which contributes to the common stock of knowledge creates the material base of society, provides the livelihood of the community, and increases welfare. But at the same time, the technical action of the society as a whole determines social structures, rules, customs and culture of the society, that is, the institutions of the society. Moreover it shapes the frame of mind of the community. The accustomed ways of doing and thinking becomes habitual and creates 'habits of thoughts'. After established, the habits of thoughts that are conditioned by the material environment in this way, are institutionalized over time. So briefly; in this scheme any alteration in the state of industrial arts changes the material base of society; the new material circumstances form new habits of thought; and the new habits of thought 'take on an institutional character and force' in time (Veblen 1964[1914]: 7). According to him, men's interest in the material means of life shapes the whole economic life history of any community; this interest always accompanies men in life and it affects the cultural structure at all points. Veblen analyzes social change in terms of cumulative causation: "the economic life history of the individual is a cumulative process of adaptation of the means to ends that cumulatively change as the process goes on" (1898: 391). Within the framework of Veblen's analysis, the debate on the impact of technology on the social and economic systems of pre-modern societies does not seem meaningful. Because, according to Veblen, technical action of men shapes his living in all ages. There was technological progress in pre-modern period too, because it originates from one of the natural tendencies of human beings, the propensity to useful effort, that is, the instinct of workmanship. It can be said that Veblen's position is close to Braudel's approach to technology who says

that “in a way, everything is technology”, even the small efforts of man to make a mark on the external world (Braudel 1979: 334). However it is true that the impact of technology on the life and habits of thoughts of the community has increased substantially in modern age by the machine process.

There are two types of behavior which are in conflict with each other in Veblen’s theory of social change; technological (instrumentalist) and institutional (ceremonial) behaviors. Technological behavior which has an ‘iconoclastic nature’ creates new material conditions whereas institutional behavior resists change and tries to preserve existing situation. Ceremonial institutions are based on legend, inherited beliefs, mores, status and the hierarchical order of the society; they are inhibitory in nature. On the other hand, the technological facet of human culture is towards to improve scientific knowledge and technical skills. The resistance of ceremonial institutions to technological change is due to the fact that new technological arrangements threaten the status of some groups and classes. Veblen calls these institutions that hold out against change as ‘imbecile institutions’ and asserts that:

> But history records more frequent and more spectacular instances of the triumph of imbecile institutions over life and culture than of peoples who have by force of instinctive insight saved themselves alive out of desperately precarious institutional situation (1964[1914]: 25).

Like Veblen, Ayres also has contrasted *technological (instrumental*) behaviors with *institutional (ceremonial)* behaviors and have emphasized the “past-binding” nature of institutions. What he calls as the “tool combination-tool accumulation principle” is

accelerative in nature and performs constant pressure against resistant qualities of ceremonial institutions (Tilman 2004: 261). Ayres argues that:

> Technological development forces change upon the institutional structure by changing the material setting in which it operates. But the adoption does not involve a change in the character of the ceremonial residue which survives the change. There is not such a thing as an institution (or a set of institutions) that is "appropriate" to a given technology in any but a negative sense (1962[1944]: 187).

Because of this technology/institutions dichotomy, institutional order changes gradually, lagging behind the changes in technology. The terms like 'cultural lag' or 'friction' or 'path dependency' refer to this delay. This lag between institutional and technological change have continuous impacts on the social order.

However, it is important to note that this dichotomy between technology and institutions does not imply a one way causality runs from 'dynamic' technology to 'static' institutions in Veblen's system of evolutionary change. Institutional system cannot be regarded entirely static. Moreover, one should note that the scheme of social change mentioned before in which new material conditions with new technologies create new habits of thoughts and new habits of thoughts are institutionalized over time is not as simple as it seems at first glance. The existing institutions also affect both habits of thoughts and technology. They play an important role in determining the pace and direction of technological change. In Veblen's system, social change consists of a sequence of change which involves institutions affecting technology and technology affecting institutions. They have a reciprocal relation instead of a unilateral one. Similarly, habits give rise to

institutions, but institutions in turn maintain those habits over time and "continue to do so even after the objective conditions which gave rise to them have changed" (Rutherford 1993: 388)

The fact that institutional change consists of a cumulative sequence in Veblen's analysis allows him to endogenize technology. And this is among the most important features of Veblen's analysis that differentiates it significantly from the analyses of both the scholars discussed in Chapter 2 and new institutional economists. Veblen's system is more sophisticated and realistic in terms of its explanatory power on the complicated issue of the process of social change. The other approaches analyze the relationship between technology and institutions on the basis of either response of existing institutions to new technologies, be that permissive or deterrent, or institutions' ability to provide right incentive structure to promote technological innovation. Even though they accept institutions play a partial role in the supply of technology, technology remains an exogenous factor in their analyses. Furthermore, it is obvious that the endogeneity of technology in Veblen's analysis is quite different from Persson's assertion that technology is endogenous to production process. Although Persson's claim that technological progress originates from production process is not completely opposite to Veblen's analysis, the conclusion that similar countries follow same technological trajectories as an implication of endogenous technology is incompatible with Veblen's theory of social change. For him, same technologies may result different development paths under different social conditions. I will review this issue in more detail in the following pages, now it is sufficient to say that because of the embeddedness of technology in social and

economic system, Veblen asserts that societies may have different development trajectories even if they use the same technologies.

Moreover, the previous analyses relate culture with technology focusing only on conduciveness of particular cultures to technological change and ignore the impact of material conditions on culture. The main problem of cultural explanations seems to be that they cannot provide a satisfactory explanation for the roots of cultural differences among different societies apart from stating that those differences are traced back to the long histories of civilizations. The main weakness of Clark's arguments, for instance, is the deficiency to explain the origins of different cultural values of Asian societies. On the other hand, Veblen analyzes culture and material conditions of society as determining and conditioning each other with a more holistic perspective.

Veblen traces the basis of technology/institutions dichotomy to his basic premises about human behavior. He thinks that the 'instincts' take root in the technical action of men which creates the technological progress as the most dynamic factor in social change. Conflict among institutions is due to the two different natural tendencies of people: peaceable instincts and predatory instincts. Peaceable instincts are directed towards improving the material conditions whereas predatory instincts tend to impede any improvement. He scrutinizes three peaceable instincts that determine economic activities: 'the instinct of workmanship', 'the parental bent' and 'the idle curiosity'. According to Veblen, chief instinct among those that 'conduce to the material well-being of the community' is the instinct of workmanship (1964[1914]:

25). The instinct of workmanship is oriented towards ‘the ways and means, devices and contrivances of efficiency and economy’, creative work and technological mastery (1964[1914]: 33). It provokes the development of technological proficiency and insight in the community. The cumulative habituation of the sense of workmanship has very substantial consequences for the state of industrial arts. It ‘brought the life of mankind from the brute to the human plane’ and it has continued to pervade the works of man in all the later growth of culture (1964[1914]: 37).

The parental bent which is associated with the ‘caring and loving tendencies’ of humanity has a wider scope than parental solicitude to children. It reinforces the efficiency of the common welfare of the community and condemnation of extravagance. Its functional content is an selfless concern for the well-being of incoming generations. Finally idle curiosity is simply the man’s want to know things. It manifests itself in ‘play’ and ‘fundamental’ thinking. It is “idle” in the sense that no utilitarian aim breaks into its habitual exercise. But the material information obtained by the idle curiosity increased the available knowledge of society and serves to the ends of workmanship. These three instincts are not narrowly focused particularized tendencies. They require adaptation to the changing social environment; rather than being ‘rigid value constraints’. They have “transcultural significance in an instrumental sense as ends-in-view; rather than as ends-in-themselves” (Tilman 2004: 103). Veblen thought that these positive instincts were continually being infected and contaminated by harmful values and tendencies. These are basically pecuniary, exploitative and emulative tendencies. Pecuniary tendencies are directed to the dominance of monetary rewards and incentives;

exploitative traits are associated with war and imperial pursuits; emulative tendencies are about comparison of people on the basis of status, prestige and class (O'Hara 2000: 36).

As we have made it clear, in Veblen' analysis 'instincts' provide the underlying dynamics of human behavior. However they are not the sole and direct determinants. The intelligence guides the working-out of the instincts. Purposes of life are determined by instincts; but the ways and means of accomplishing them are a matter of intelligence. As a consequence, the patterns of behavior are shaped by institutions, instincts, technology and intelligence together. Institutions are extremely important in the explanation of human behavior; Veblen writes:

> The wants and desires, the end and the aim, the ways and the means, the amplitude and the drift of the individual's conduct are functions of an institutional variable that is of a highly complex and wholly unstable character (Veblen 1919; in Hodgson 2000: 324).

For Veblen thus institutions are outcome of individual behavior and habituation but at the same time they affect individuals: "…through the habituation of individuals, that institutions arise; and it is in the same experience that these institutions act to direct and define the aims and end of conduct" (Veblen 1919; in Hodgson 2000: 324). This idea that individual is socially and institutionally constituted is among the most important characteristics of original institutionalism.

The notion that technology provides the inner dynamics of institutional and social change is shared by a lot of scholars. Another institutional economist, Walter C. Neale also thinks that institutions change in response to new technologies. He thinks

that the emergence of the self-regulating market system during the latter part of the eighteenth century and the first half of the nineteenth century analyzed in detail by Polanyi in *The Great Transformation* is a major case of institutional change as an adaptation to new material conditions and new technologies (Neale 1987: 1201).

Polanyi, in this book, analyzes the historical steps which transform the isolated markets into a market economy; in other words the regulated markets into a self-regulating market. Until the Industrial Revolution, the regulated markets prevailed. Accompanied by the changes that Industrial Revolution brought in industrial production, an attempt to set up one big self-regulating market was launched. According to Polanyi, the developments listed as factors that led to Industrial Revolution like "the expansion of markets, the presence of coal and iron as well as a humid climate favorable to the cotton industry, the multitude of people dispossessed by the new eighteenth century enclosures, the existence of free institutions, the invention of machines", all together brought about such a rupture (Polanyi 2001[1944]: 42). The basic characteristics of this revolution however is not the rise of factory towns, the emergence of slums, long working hours, and low wages or the concentration of industries. These were incidental in comparison with the fundamental change; the establishment of market economy. And the establishment of a market economy resulted from the impact of machine on a commercial society. But what he means is not that new machines were responsible for the establishment of market economy. He explains his argument as follows:

> We do not intend to assert that the machine caused that which happened, but we insist that once elaborate machines and plant were used for production in

> a commercial society, the idea of self-regulating market system was bound to take shape (Polanyi 2001[1944]: 43).

The new productive organization following the Industrial Revolution; the use of elaborate machinery and plant involved in the development of the factory system made investments in industrial production more risky unless the continuance of production was assured. The more complicated industrial production became, the more important it became to safeguard the supply of the elements of production, that is; the supply of labor, land and money which are not commodities actually. They should be available for purchase in order industrial production not to be interrupted. The necessity to commodify land, labor and money was "the inevitable consequence of the introduction of the factory system in a commercial society" (Polanyi 2001[1944]: 78). Then he analyzes how labor, land and money markets were created. (Actually the land market have already been largely created by the enclosures of the 1790s; he focuses more on the creation of labor market, frictions in this process and of course 'double movement' created by the extension of market to the land, labor and money).

According to Neale, it is possible to extend the underlying argument of Polanyi–even though he did not explicitly state in this way– to show how existing institutions shaped the new system. He explains how existing institutions determine the new system as follows:

> Two closely related sets of institutions limited and directed the changes. First, the existing system of land holding and enclosures determined that the nature would be privately owned. Second, the system of commercial markets and the institutions of private property determined that the machine

> technology would be fitted into a system of markets. Third, the evolving system of liberal government determined that the role of government should be severely restricted. Fourth, the institutions of private property determined that the costs could be quickly cut when inputs were not needed would be the cost of labor (Neale 1987: 1201).

What Neale points out is some kind of path dependency. Interpreting the establishment of self-regulating market as a response to technological change is not wrong; however we need to keep in mind that perhaps the most important point in Polanyi's analysis is demonstration that self-regulating market was the product of continuous and conscious state intervention. It was not a natural response of society. Indeed, the reaction of society in the face of attempts to establish a self-regulating market constituted the counter-movement of 'double movement' and it was spontaneous and natural.

3.2.2 Evolutionary History of Western Civilization

Veblen analyzes the history of Western Civilization in basically two phases: the "peaceful" era and the "predatory" era and he subdivides the same historical period into four stages, namely "savage era", the "barbarian era", "the era of handicraft" and "the machine era" (Veblen 1964[1914]). It is needless to say that the most important factor that determines these cultural stages is technology; they evolve within the context of different material conditions and habits of thought created by these material conditions. Only the first of these stages corresponds to peaceful era. Veblen thinks that 'it is safe to assume' that the beginnings of pecuniary control fall in the

early half of the Neolithic period. During the savage era technology was common. Transition to the predatory era begins with the establishment of property. According to Veblen, the advent of ownership brought a 'mutual give and take' relationship between workmanship and pecuniary culture; he notes that:

> The increase in industrial efficiency due to a sufficient advance in the industrial arts gives rise to the ownership of property and to pecuniary appreciations of men and things, occupations and products, habits, customs, usages, observances, services and goods. At the same time, since predation and warlike exploit are intimately associated with the facts of ownership through its early history (perhaps throughout its history), there results a marked accentuation of the self-regarding sentiments; self-interest displaces the common good in men's ideals and aspirations (1964[1914]: 160).

The Barbarian era had lasted during the Middle Ages and gave way to the era of handicraft. Historically, the modern era begins with the rise of handicraft era which lasted until the late eighteenth century in England. The habitual outlook of the handicraft era is twofold: technological and pecuniary: "the handicraft system was an organized and regulated system of workmanship and self-help" (Veblen 1964[1914]: 211). The system broke down when the state of industrial arts no longer enabled the workman to acquire necessary technological proficiency while that they were still able to pursue their individual pecuniary interests. It evolved to a new phase of the pecuniary culture. The increasing differentiation between workmanship and salesmanship grew into a "division of labor" between industry and business. Veblen states that:

> By this division of labor, or divergence of function, a fraction of the community came to specialize in ownership and pecuniary traffic, and so came to constitute a business community occupied with pecuniary affairs, running along beside the industrial community proper, with a development

> of practices and usages peculiar to its own needs and bearing only indirectly on the further development of the industrial system or on the state of the industrial arts (Veblen 1964[1914]: 213).

In the modern institutional order, the historical dichotomy between 'instrumental' and 'ceremonial' behaviors have turned into a conflict between two different occupations: the 'industrial employments' and the 'pecuniary employments'. Engineers, technicians and workmen engaged in industrial works whereas businessmen and legal owners of the industrial equipments pursue pecuniary gain. The dominance of pecuniary principles as standards of efficiency is the distinguishing feature of business era in comparison with the handicraft era.

Towards the end of the handicraft era, masters (employers, traders, captains of industry, businessmen) gave their whole attention to the business face of the industry. Veblen states that "capitalism emerged from the working of the handicraft system, through the increasing scale and efficiency of technology" (1964[1914]: 282). Although historically machine age succeeded the era of handicraft, they extensively overlapped. Beginnings of machine industry were sporadic and came up as 'an outgrowth of the handicraft technology'. Machine industry developed on gradually. Its initial stages could be seen in the early eighteenth century in England. Only toward the end of that century the complete effects of machine technology on the industry became tangible. Conventional identifications of this era with capitalism or free competition is not true according to Veblen, it can best be characterized as the era of machine industry. He asserts that:

> The era of machine industry is spoken as the era of factory system, a large-scale industry, as the age of Capitalism or of free competition, or again as an era of the credit economy. But as seen from the point of view of technology and more specifically from that of workmanship as it underlies the technological system, it is vest characterized as the era of machine industry, or of the machine process…As a technological period it is commonly conceived to take its rise in the British industrial community about the third quarter of the eighteenth century, the conventional date of the Industrial Revolution…to coincide with the earliest practical use of certain large mechanical inventions of that age (1964[1914]: 299).

In the modern machine era, the instinct of workmanship which takes place on the basis of industry was disgraced and subordinated to the pecuniary aims of the 'captains of industry'. The share of workman in the machine industry is just the assistance for keeping pace with the machine process at points where it is defective. In other words, workman's role in this process is supplementary at its best. Moreover, workmanship comes to be confused with salesmanship. Under the canons of pecuniary valuation, the standard of efficiency in economic affairs became the proficiency in pecuniary management instead of technological mastery; unearned gain is accepted as the measure of productiveness.

For Veblen, the prevalence of salesmanship is perhaps the most serious obstacle to the advance in workmanship. He says that: "In every-day phrase, under the rule of the current technology and business principles, industry is managed by businessmen for business ends, not by technological experts or for the material advantage of the community" (1964[1914]: 351). There are some inhibitory effects of investors' surveillance over technological efficiency by well-known channels of limiting the output and holding up the price to increase pecuniary gain. Moreover, the reluctance of investors and businessmen to replace the obsolete methods and plant with new and

more efficient equipment is also inhibitive (Veblen 1964[1915]: 32). As we have seen, Veblen's analysis on efficiency in economic matters is quite different from the new institutional analysis. North and Thomas, for instance, define efficient economic organization as the one that entails the establishment of property rights "that create an incentive to channel individual economic effort into activities that bring the private return close to the social rate of return" (1973: 1). According to them, the establishment of property rights is necessary in order to make it worthwhile to "undertake socially productive activity" for economic growth to occur. However, the conflict between business and industry in Veblen's analysis implies that property rights may be inhibitory to the productive activity because of the pecuniary aims of the owners of industrial plant. Moreover, property rights that protect obsolete technologies also obstruct the technological development.

The machine technology gave a material character to the habits of thoughts of the community. The routine and discipline of machine industry spread beyond the mechanical occupations and determine the habits of all members of the modern society. Rick Tilman explains the peculiar value system created by the machine process as follows:

> Machine technology in the industrial process generates its own value system in the minds of those who work around it by fostering or inculcating its two kinds of rationality in labor force. This rationality is characterized by secularism, equalitarianism, reasoning in a matter-of-fact way from cause to effect, and creates dislike for the more traditional forms of authority and its privileges. In Veblen's scheme, it is the technological values generated by the machine process which eat like a corrosive acid into the institutional vitals of the present order (Tilman 1973: 157).

Moreover, in this new era technology comes into a close contact with science. Both of them, science and technology, obtained 'a matter of fact character' which has never seen before. 'Anthropomorphic imputation' is not operative in the new kind of scientific inquiry different from the antecedent periods. The machine technology and material sciences enabled men to think in terms of cause and effect. According to Veblen, the improvements in machine technology paved the way to create a new scientific method in which the causality of events is analyzed in terms of cumulative change. So, eventually modern industrial life will displace the old habits of mind by "a substantially materialistic habit of mind which seeks a comprehension of facts in terms of a cumulative sequence" (Veblen 1898: 396).

Before the modern era, creative workmanship was an instrument of scientific inquiery. It was also a major premise in all effort of innovation and reconstruction of the scheme of institutions. Innovation defined by Veblen as "the utilization of newly acquired technological insight" was taken under the command of businessmen in the modern machine system (1964[1914]: 41). The chief use of the inventions of modern era such as the telephone, the typewriter and the automobile is in the service of business, not of industry. And for these examples, invention is the mother of necessity. Indeed; for Veblen, "…here and now, as always and everywhere, invention is the mother of the necessity" (1964[1914]: 314). According to him the aphorism that "Necessity is the Mother of Invention" is the product of an uncritical rationalism. Because it offers an '*ex post facto'* account of changes that take place and reflects an ancient preconception that interprets all changes as improvement for the sake of the accomplishment of some foreknown end. He denies this aphorism not

because he assumes like Mokyr that necessity is always inherent in human insatiability. He explains his position in this debate as follows:

> Doubtless, the felt need of ways and means has brought on many changes in technology, but doubtless also the ulterior consequences of any one of the greater mechanical inventions have in the main been neither foreseen nor intended in the designing of them. The more serious consequences, especially such as have an institutional bearing, have been enforced by the inventions rather than designed by the inventors (1964[1914]: 317).

Similarly, Schumpeter accepts the fact that for a given innovation to occur, some kind of need must exist; but he points out that "such a need rarely determines what kind of solution will satisfy it", and he also says that it may go unsatisfied for an indefinite period of time (1839: 85; in Mokyr 1990: 151). Veblen does not imply that modern inventions do meet any wants apart from the demand that they themselves create, but he thinks that supply-driven factors play a more important role in the emergence of new technologies especially in modern era. Veblen and Schumpeter, they both points out the uncertainties and unforeseen outcomes in the innovative process. Although this approach seems irreconcilable with Braudel's demand side explanation of technology at first sight, I do not think that these two approaches are mutually exclusive at all points. Extensive use of a particular invention may necessitate a persistent demand as Braudel claims, but the initial emergence of an invention does not always have to wait to be demanded.

In his whole analysis, Veblen focuses on the evolution of "white race" in Europe instead of having a global perspective. The main reason for this is the fact that European cultural system is at the forefront of social evolution. Other cultures

remained behind; they could not pass the predatory era (Kızılkaya 2007: 182). Veblen thinks that modern civilization; indeed all history lies within the pecuniary culture as a whole. However the Western culture of the modern times belongs to the peaceable phase of this pecuniary culture, rather than to that predatory phase "with which the pecuniary scheme of life began somewhere in the lower barbarism, and that has repeatedly closed its life cycle in the collapse of one and another of the great dynastic empires of the world" (Veblen 1964[1914]: 171). Because of this, he does not elaborate on how and why Western civilization has acquired a different character in comparison to other regions and cultures of the world.[12] Although we cannot find direct inferences for the roots of the Great Divergence in his writings, I still think that the insights from his analysis about social change may provide a new perspective to the debated issues.

Clarence Ayres who systematizes Veblen's thought and interprets the Western history brings an explanation to the issue of divergence.[13] Ayres, in *The Theory of Economic Progress (1962[1944])* tries to answer the following questions in order to better understand the unique development path of Europe and the mystery of Industrial Revolution: Why did the Industrial Revolution occur in Western Europe and in modern times and why not in China or in Ancient Greece? And which forces

[12] Instead, he focuses on the divergent patterns within Western Europe which we will mention in the next section.

[13] Ayres replaced Veblen's theory of instincts with Dewey's instrumentalism in order to elaborate the Veblenian dichotomy in a new light: "The influx of pragmatism and instrumentalism made possible the specification of an analytical system around the principal conflict of technological and ceremonial processes leading towards progress" (Özveren 1998: 502). According to Özveren, he has succeeded in 'systematizing' Veblen's thought. He interpreted Western history "as a progressive process born of never-ending confrontation between the principles of technology and ceremony" (1998: 502).

were operative in the modern European situation which were not operative elsewhere and at other times? According to Ayres, Europe's specialty was based on its being the frontier region of Mediterranean civilization.

> A frontier is a penetration phenomenon. It is a region into which people come from another and older center of civilization, bringing with them the tools and materials of their older life, their cereal plants and vines and fruits trees, their domestic animals and accouterments, their techniques of working stone and wood and their architectural design and all the rest (1962[1944]: 133).

The important fact is that Western Europe was a frontier in which ancient culture was only partially installed. The culture of Western Europe was technologically continuous with the culture of the whole Mediterranean area and took the advantages of "cross-fertilization" of cultures. But it was institutionally discontinuous. During the time when Europeans inhabited North America, all technological accumulation of ancient agricultural civilization was introduced to the Western Europe. At the end of this period the tie with the Mediterranean Empire was severed. Feudal system emerged from an 'institutional chaos' and it was a native growth. Even the Christian church underwent a serious transformation. It is true that the church was an important source of institutional resistance to technological change. Under the leadership of the church, feudal society opposed all the great innovations of industrial society; however that opposition was no effective. It was ineffective because Christianity was an "alien creed which bore much less heavily upon the Western peoples than did Islam upon the Arabs, Hinduism upon India, or Confucianism upon China" (Ayres 1962[1944]: 135). As a frontier community,

Europe was endowed with the whole technological heritage of a parent culture, but was completely severed from institutional heritage of its parents:

> The result was unique…Western Europe was the seat of a great civilization in the centuries that fallowed was due altogether to that endowment no important part of which was ever lost; that it was all the great civilizations of time incomparable the youngest, the least rigid, less stifled than any other by age-long accumulations of institutional dust, more susceptible by far than any other to change and innovation. Almost certainly it was this composite character which made the civilization of mediaeval Europe the parent of industrial revolution (Ayres 1962[1946]: 137).

Ayres completely opposes to the static image of Middle Ages; according to him, the Middle Ages were a period of 'ferment, pregnant with imminent and fundamental change'. It was the 'true parent' of the industrial revolution.[14] He interprets the Industrial Revolution as a process consisting of "a series of social changes, affecting every aspect of life, in which "mechanical invention" plays a decisive part" (1962[1944]: 153). After listing some important inventions like gunpowder, the compass, printing, the symbol of zero, the mill wheel and the clock, he analyzes the invention of printing as a clear case of cross-fertilization. The actual invention of printing from moveable types took place in northern Europe. Indeed the art of printing was developed in China in the thirteenth century. Ayres questions why Chinese failed to invent the type-molds even though they are also familiar with the arts of casting metals. The answer is not about the Chinese character as some scholars claim, it was about Chinese language. Chinese language is non-alphabetical; it has a problem of textual purity. The necessity to use a vast number of distinct ideographs made it more difficult and less worthwhile to make interchangeable

[14] Ayres uses the term of "Industrial Evolution" entitling the seventh chapter of his book in order to emphasize gradual nature of the process.

types. On the other hand, in the West, the character of written language was quite different. The use of Phoenician alphabet spread to all the written languages of the Mediterranean culture area in very early times. Then under the Roman effect, Western languages were reduced to the Latin alphabet in which only a small number of graphic symbols were made to serve all the needs of literature. The types for these symbols could easily be used interchangeably (Ayres1962[1944])

For the analysis of other important inventions, Ayres reaches a similar conclusion that European inventions were the results of combination of different types of earlier devices, and the cultural contact had a decisive effect on the occurrence of these combinations. The age of discoveries was a function of ships, that the ocean-sailing ships were the result of combination of different types of earlier and simpler versions of ships. The magnetic needle was introduced from China but combined with navigation in Europe (Ayres 1962[1944]: 143-144). So the fact that European community being a frontier civilization not only provided them a rich heritage in terms of technological techniques; but also increased the probability to make new combinations of tools thanks to the cultural cross fertilization.

3.2.3 A Special Historical Development Path: England

The development path of England began to diverge from that of the Continent in the era of handicraft. England was actually in a technologically and commercially backward state in the earlier period of handicraft era. Throughout the era, she borrowed extensively from the Continental neighbors. This late start provided

England the opportunity to make use of what other countries had worked out and conduced to shorten the course of industrial progress. In this way, England was able to refrain from the ‘obstructive inertia’ that other continental countries had experienced. Technological improvements in the means of production at the end of the handicraft era called forth to the beginning of machine era. According to Veblen, England was able to enter a different development path thanks to her favorable geographic position. In the transition period from medieval to modern times, England was in arrears, culturally, as compared with the rest of the west and central Europe. Actually she was backward in terms of industry, material civilization, intellectual achievement and the other arts of life. However during the succeeding century, England managed to stand abreast of her Continental neighbors because of her disengagement from political, military and religious disturbances (Veblen 1964[1915]: 90-92).

Veblen divided this part of British history into two phases: The first phase which came to its most pronounced manifestation in the Elizabethan era was between the early sixteenth and the early seventeenth centuries. The second phase began in the later seventeenth century and its most striking event was the Industrial Revolution. In the first period England was the borrower of the new technologies in industry. The second period, however, was an especially creative era for England and created the current technological system which is ‘characterized and dominated by the machine industry’ (Veblen 1964[1915]: 92-93).

The state-making period in Europe coincided with the economic decay of the Continent and gave England a differential advantage in trade and industry. English industrial community easily left behind their industrial and commercial rivals on the Continent:

> The great advantage of the English was their easily defensible isolation, which left them in comparative peace; and the dynastic ambitions and patriotic and religious fervor of the Continental states, which brought them to the extremities of economic confusion and industrial decay, and so left the English free to make a doubtfully efficient use of an unparalleled and irretrievable opportunity (Veblen 1964[1915]: 98-99).

Henceforth, the era of handicraft ends in the Industrial Revolution in England rather than exhaustion and political collapse.

In the modern era, business enterprise and the machine process as the two driving forces of modern culture created new habits of thought among the English community. Uniformity and 'standardizing character of the process of machine technology' began to determine the ordinary routine of life (Veblen (1964[1914]: 311). Materialistic value system of machine technology affected the ways of thinking and enabled English community to think in terms of cause and effect. According to Veblen, the particular value system of machine process which is adversative to the business principles will undermine the existing institutional structure of the society in the long run. He elaborates this idea as:

> The growth of business enterprise rests on the machine technology as its material foundation. The machine industry is indispensable to it; it cannot get along without the machine process cuts away the spiritual, institutional foundations of business enterprise; the machine industry is incompatible

> with its continued growth; it cannot, in the long run, get along with the machine process (Veblen 1958[1904]: 177).

The spread of the value system created by the machine process created 'a materialistic bias' in the English community's frame of mind. This is the most striking feature of the English culture in modern times according to Veblen who says that '"Reality," in English, means materiality' (1964[1915]: 105). He claims that this is also the most important difference between the English and the German scheme throughout the modern period.

Veblen analyzes the rapid German industrialization after 1870 in comparison with the English experience in his *Imperial Germany and the Industrial Revolution (1964[1915]).* In this period, Germany successfully borrowed technological elements from England and achieved the industrial modernization. However machine technology in Germany did not undermine the existing institutions. That is, technology did not destroy its own base in German case because this technological advance was not made in Germany, but was borrowed from England without taking over the English 'use and wont' at the same time. Hence, the German case should be thought as an 'anomaly' according to Veblen:

> The result being that Germany offers what is by contrast with England an anomaly, in that it shows the working of the modern state of the industrial arts as worked out by the English, but without the characteristic range of institutions and convictions that have grown up among English-speaking people concomitantly with the growth of this modern state of industrial arts. Germany combines the results of English experience of modern technology with a state of the other arts of life more nearly equivalent to what prevailed in England before the modern industrial regime came on; so that the German people have been enabled to take the technological heritage of the English

> without having paid for it in the habits of thought, the use and wont, induced in the English community by the experience involved in achieving it (1964[1915]: 85-86).

Other continental neighbors had also borrowed technology from England but what made the German case unique is 'abruptness, thoroughness and amplitude' of its appropriation of this technology while preserving its own archaic culture.

This difference between the German and English paths of industrialization is quite natural according to Veblen, because technology is embedded in culture. It refers to a historical phenomenon and creates different trajectories within different institutional, historical and cultural conditions. Transfer of technology is possible but same technology may give quite different results in different conditions.[15] It is obvious that habits of thought are not transferable. The modern policy prescriptions suggest underdeveloped countries to transfer successful institutional structures with a logic that assumes "one fits all". This is also because of defining institutions narrowly as legal rules and sanctions. The old institutional economic analysis, defining institutions broadly enough to encompass the habits of thoughts besides rules, norms and conventions is completely against the idea that institutions are transferable. What Germany achieved is a new synthesis with the technology borrowed from England

[15] An evolutionary economist, Richard Nelson whose studies exhibit some similarities with Veblen's analysis at certain points also claims that technology is an aspect of human culture. One striking feature of the evolution of technology compared with other aspects of human culture is the rapid pace of change according to him (Nelson 2005: 463).

and its own old institutions without experiencing the usual friction between technology and institutions. [16]

Polanyi in *Great Transformation (2001[1944])* explains the factors that contributed to the specificity of England in a chain starting from the Industrial Revolution, consequent social dislocations, and the institutional arrangements to commodify labor (Özveren 2000: 157). According to Polanyi, the most important difference of English case from the Continent is the altered position of working class as a result of the process of 'institutionalization of labor as fictitious commodity'. The Parliamentary Reform Act of 1832 politically defined the position of labor and denied them the vote; economically, the Poor Law Reform Act of 1834 excluded them from the relief and subjected them to the price-setting mechanism of market. The inability of British working class to intervene to the trend of events made English development path divergent from that of the Continent:

> It was precisely this lack of participation on the part of the British working class in deciding its own fate that determined the course of English social

[16] David Landes has also made a comparison between these two countries and contrasted the "pecuniary rationality" of British business with the "technological rationality" of German business. According to him, British industry was based on 'strictly pecuniary business logic' and unconcerned to the disturbances in industry. It tended to treat technology as a means of gaining pecuniary returns. On the other hand Germans had a different rationality trying to maximize the technical efficiency instead of returns. For the German case, he says that: The means had become the ends (Landes 1969: 354). According to Arrighi, this difference can be explained by the different positions of these business communities and the role of their governments in the process of world market formation. "The pecuniary rationality of British business was primarily a reflection of the control wielded by the British state's control over the process of world market formation. The technological rationality of German business, on the other hand, was a response to the various challenges that the process of world market formation posed to the integrity of the newly formed German state" (Arrighi 1994:155). Moreover, Arrighi interprets these two different rationalities as the obverse sides of the "double movement" of Polanyi. According to him, the technological rationality of German business was more successful in encouraging the industrial growth because of its more systematic application of science to industry.

> history and made it, for better or worse, so different from that of the Continent (Polanyi 2001: 174).

First thing to keep in mind, while comparing England with the Continent, is that the Continent experienced industrialization in a gradual manner instead of the abruptness of the Industrial Revolution. According to Polanyi for whom the pace of change is as important as the direction of change, this was a big difference. The Continental laborer did not have to live the 'degrading pauperization of Speenhamland'. His social and political status rose in contrast with the situation of English working class: "From the status of a villein he changed-or rather rose-to that of a factory worker, and very soon to that of an enfranchised and unionized worker. Thus he escaped the cultural catastrophe which fallowed in the wake of the Industrial Revolution in England" (Polanyi 2001: 184). The Continental laborer gained also political recognition due to being an ingredient in the making of national unity.

Moreover the time interval of a half century between industrialization and the establishment of a market economy in England and those in the Continent is also important because the general contexts changed in this period and the Continental countries did not have to replicate the English path. There are at least two important factors that made the English and German and other Continental countries' industrialization paths divergent. First, the 'selective imitation' was the advantage of Germany as a latecomer; Germany did not have to pay the prices that England has paid because of the errors in the process of learning-by-doing. Second, England as a forerunner experienced an institutional 'lock-in' in the end of process. Once having innovated a new institutional pattern and invested on it, England "becomes

overburdened with responsibilities of keeping the engine going at a time when the returns continue to diminish" (Özveren 2000: 161).

In the Veblenian analysis, there are two kind of cumulative processes that locked-in England as a forerunner. The first is about the cultural consequences of the industrialization dominated by machine process: the so called dichotomy between the slow-changing ceremonial institutions and the dynamic technological institutions and the inhibitive habits of business in the whole process (Özveren 2000: 162). The second is about the adaptation of old habituation to the exigencies in the use of new industrial ways and means. Veblen says that:

> …it always embodies something of the principle of the dead hand; and along with all the salutary effects of stability and harmonious working that may be credited to such systemization, it fallows also that these standing conventions out of the past unavoidably act to retard, deflect or defeat adaptation to new exigencies that arise in the further course (1964[1915]: 30).

Thereby, we can say that Germany as the representative of the Continental development pattern had two main advantages over England: First was derived from all technical advantages of being the latecomer. Second was the ability to refrain from cultural consequences of the abrupt Industrial Revolution and the new habits of thought which undermine its own bases.

3.3 Conclusion

In the second part of this chapter, I examind old institutional economics' approach to technology. I showed that different from NIE, OIE defines institutions broadly and does not overlook their role in shaping human action besides being constituted by individuals. Technology is also defined more broadly by this approach; technological knowledge and innovation is not viewed as the product of individual creativity but the common social heritage of past; it is viewed as a fact of group life. Moreover technology is socially embedded according to this approach; it is a cultural and historical phenomenon. Because of this, transfer of technological knowledge and certain techniques do not give similar results in different cultural and historical conditions.

NIE's approach to technology-institutions relations is constricted to make assessment about institutions' permissiveness or deterrence to new technologies. According to their analysis there are 'good' institutions which are more conducive to promote new techniques, open to new information and change; yet there are also 'bad' institutions in the hands of vested interest group mostly known as the center of resistance to technology. To have those good institutions has a key importance to be successful technologically and economically. This is a rather superficial approach in comparison with the analysis of OIE and is largely due to adopting a narrower definition of institutions. The difference between these two approaches is due to the difference between NIE' focus on specific institutions and their role in social and

economic processes separately; and OIE' analysis of economy and social change as institutionalized processes.

OIE provides an analysis in which institutions and technology have an organic relationship. In this perspective, technology is defined as a system of knowledge which has an institutionalized character. That is, technology and institutions are not exogenous to each other in any way. Technology is an endogenous factor in old institutional analysis; it provides the inner dynamics of the social system. It arises from man's collective activity towards realizing the material interests of society. Theorizing technology as endogenous is not unsupported in this analysis. The theoretical framework of Veblen, starting from the premises about human behavior to the characteristics of institutions and the dynamics of institutional change theorizes technology as a dynamic and endogenous factor. This approach presents an analysis of institutional change focusing on technological foundations of the evolution of institutional order and presents a holistic theory of technological progress.

Moreover, OIE makes a different analysis about property rights which is the most important institution for NIE. OIE claims that property rights can be operational only in relation with other customary institutions and social norms. It is not sufficient to establish property rights and their enforcement mechanisms legally. As mentioned in first part of this chapter, Greif also criticizes North's point of view who conceptualizes property rights as merely legal entities. According to him, North's analysis is deficient because it does not answer the question why people follow rules.

In order to understand under which conditions property rights work, Greif includes 'motivations' to his analysis. The motivation in Greif analysis refers to the prevalent cultural beliefs of society. Human behavior is motivated by beliefs and norms according to him. OIE's assertion that property rights need appropriate cultural and social norms to be operational implies that a certain structure of property rights that is efficient and conducive for a society might not be productive for another one especially if they have quite different cultural features. In other words, there need not be always positive correlation between the strength of property rights and economic development as North and Acemoğlu and his coauthors claim. Another fact which supports this opinion is that property ownership does not always promote economic growth because of the pecuniary aims of 'captains of the industry'. The business owners might use their power that comes from property in order to obstruct industrial development for their pecuniary gains. For the same reasons, property rights might also protect obsolete technologies and impede technological progress (Veblen 1964[1915]: 32). We have mentioned before Ankarloo's right criticism of North'analysis because he ignores the fact that power is based on property relations and property relations may be very antagonistic (1999: 15-16). Acemoğlu, Johnson and Robinson (2004) take power into account giving a central place to political institutions. Although distribution of resources determines de facto political power in their analysis, they think it as a state variable and they do not give any special emphasis to the economic power originated from property.

These two approaches differ from each other in their interpretation of institutional change, too. According to North, there are two sources of institutional change;

change in preferences and change in relative prices. The basic mechanism of institutional change in this framework is that, when relative prices change, altering the existing contract becomes more profitable for at least one party of the exchange. To alter the contract, certain customs, rules and other institutions are altered. The interpretation of serfdom as a contract between peasants and lords and its disappearance when relative price of land and labor (indeed, when the existing ratio between land and labor changed) changed is an example of interpreting institutional change in this framework. The agent of change is entrepreneur: political or economic. This analysis considers changes in prices and preferences exogenous. However, for OIE, preferences are endogenous because economic behavior is a learnt-behavior. While institutions are made by individuals they also shape the frame of minds of the individual. Moreover, because NIE sees institutions as simple legal establishments, it is possible to change them by the deliberate actions of the political, judicial or economic agent. Certain political groups in power can alter and transform existing institutional structure to advance their interest. While formal rules change, informal constraints of the society described as routines, customs, traditions and culture by North, persist for a while. The friction between formal rules and informal constraints may remind us the classical dichotomy of Veblen between technology and institutions. However, according to Veblen, institutions do not change that easily for the purposes of individual agents. Even if this would be possible in legal terms, the agent of this change cannot be perceived as an individual immuned from the ideologies and frame of mind imposed by the existing institutional structure.

As for the interpretation of the Industrial Revolution, both approaches tend not to see it as a sudden break because they perceive social change as evolutionary. North defines the Industrial Revolution as an acceleration in the rate of innovation but he traces the origins of this acceleration back to the period before traditional chronology of the Industrial Revolution. What was more decisive in the process is the rise of parliament in England, establishment of property rights by this means and increasing private return on innovation. On the other hand, for Veblen, the most important factor that identifies the whole period was machine industry. And machine industry developed gradually as an outgrowth of the handicraft technology. The initial stages of machine industry were seen in the early eighteenth century in England and the complete effects of machine technology on industry became tangible about the third quarter of the century that is the conventional date of the Industrial Revolution. Veblen explains the particularity of England as its geographic isolation as a factor that kept away England from political, military and religious disturbances and by this way prevented any distruption in the industrial progress. Although this explanation seems to be teleological claiming that England underwent an inevitable process, transition to machine industry, faster than others, I do not think that it is teleological. Because Veblen claims that peaceful political atmosphere of England gave an opportunity to deal with large mechanical problems that called a new technology at particular conjunctures in the end of handicraft era. There was not anything inevitable in the process.

About the roots of the Great Divergence, we cannot find any significant answer to the old questions of economic history in the writings of Veblen, because he focuses

on the history of Western civilization and divergence within Europe instead of examining the issue with a global perspective. New Institutional Economists also prefer to concentrate on divergence within Europe. Ayres addresses the issue on a global level. Although in ultimate resort, Ayres also seems to reduce difference between Europe and other parts of world to geographic terms, there are important points in his analysis that deserve to be underlined. First of all, he claims that being a frontier civilization provided Europe a chance to take advantage of cross-fertilization of cultures. In his analysis the major progressive force in technological change is the tool combination-tool accumulation principle. Geographical position of Europe made possible to combine technical abilities of different civilizations more easily. In addition to that, the culture of Western Europe exhibited a continuity in terms technology with the cultural richness and diversity of the whole Mediterranean area. As claiming political diversity of the Continent gave an additional impetus to technological progress in Europe, Mokyr calls attention to a similar point. He stresses the importance of combining the prescriptive knowledge of England with propositional knowledge of France for the Industrial Revolution. Ayres emphasizes the importance of cultural interaction on a global level. When appreciating Europe's enthusiasm (as Landes did) in borrowing, imitating and improving technical inventions of different civilizations, one should take into consideration that Europe had a geographical advantage in synthesizing and improving those inventions easier. A final point in Ayres analysis is that Europe owed her success to its detachment from the institutional heritage of previous civilizations while endowing the technical

heritage of them. This made Europe less rigid, less susceptible to change and innovation in comparison with other civilizations.

CHAPTER 4

CONCLUSION

The changes that take place in economic history always attract the attention of scholars who seek the true origins of our time. The impact of technology on economic and social change, the origins and nature of modern economic growth rates and the role of institutions in development are among the most debated issues of both economic history and economic theory because of their historical and theoretical dimensions. This study was an attempt to evaluate different answers given to 'the old questions' of economic history and to take a step for the recognition of the relevance and importance of original institutional analysis for this literature.

In the first chapter, I discussed the state and development of technology and its impacts on economic growth in pre-modern period. I searched for the answers of questions that have been preoccupying economic historians for a long time about the issues such as the origins of modern economic growth, the causes of the Industrial Revolution and the roots of the Great Divergence. I examined and interpreted the literature consisting of various approaches and most often conflicting perspectives on the issue. If I summarize the conclusions that I drew from this discussion, first of all it needs to be stated that the widespread dark image of Middle Ages devoid of technological change does not coincide with the historical facts. The pre-modern economies are generally characterized by a stationary equilibrium because of being

constrained by a Ricardo-Malthus trap. However it was shown that there was crucial technological progress in pre-modern period even though it was largely incremental and gradually emerging. This incremental technological progress not only changed economic and social life substantially in pre-modern period but also it constituted a slowly expanding foundation for the Industrial Revolution. The second important inference from this discussion is that holding craft guild system responsible for the lack of technological progress is misleading because of basically two reasons. First is that, despite the fact that their rent-seeking activities was detrimental to the welfare of society and their opposition to certain innovations sometimes became obstacle to technological change, craft guilds contributed to technological progress by reproducing skilled workforce, setting quality standards, reducing transaction costs and information asymmetries and more importantly by supporting the mobility of skilled workforce who transferred technical knowledge.

Secondly, while it is widespread among historians now to interpret the Industrial Revolution as the outcome of a long process of innovations during the preceding centuries, one should accept that the sources of these innovations must have been primarily the organization of production that was predominantly governed by the craft guilds. As for the Industrial Revolution, I preferred to interpret the Industrial Revolution as process of both rapid and radical changes by the uses of new techniques in production process and a gradual, evolutionary transformation. Finally, after reviewing alternative explanations of the Great Divergence that emphasize the decisiveness of one particular factor among technological, institutional, cultural and geographic differences in the process, I concluded that these factors, influencing each

other reciprocally, together with other historical conditions determined the course of the historical process of divergence in favor of Europe.

In the second chapter, first I analyzed NIE's interpretation of pre-modern period and its explanations of the emergence of modern growth rates and the role of technology and institutions in obtaining economic growth. When discussing institutional explanations, the literature reviewed in previous chapter refers only to the arguments of NIE and includes institutions into the analysis by giving them a secondary role, at best and views technology more important and decisive than other things for economic development. The analysis of that literature about institutions is precluded by NIE's vision that only focuses on property rights, enforcement mechanisms of property rights, transaction costs and efficiency of markets. In this framework, explanations that give priority to technology or institutions in their role in shaping historical processes seem as conflicting and substitutes for each other. This is due to the way that NIE analyzes institutional change (as a response to exogenous price shocks or preferences changes), on the one hand, and theorizing technology as exogenous, on the other. Moreover, NIE regards providing right incentive structure to society as the most important parameter in its explanations for technological change because of its methodological individualism. Because I found institutional analysis of both NIE and the other scholars mentioned in previous chapter superficial and inadequate to understand the complex process of institutional, social and technological change, I returned to the writings of original institutionalists whose analyses differ from the new tradition in many ways.

First of all, OIE makes a more comprehensive definition of technology including every action of man intended to transform his material living conditions and view technological progress as a result of collective efforts of society. To Veblen, technology is one of the cultural phenomena and a social process. Technological change is always in process of change cumulatively and 'is held and carried forward collectively' (Veblen 1964 [1915]: 103). In a similar vein with Veblen, concerning the initial technical inventions of the Industrial Revolution, Needham asserts that "no single man was the father of steam engine; no single civilization either" (Needham 1970: 202). Veblen who deals with technology from a social point of view tries to reveal the origins of man's technical action by illustrating his basic tendencies to technological affairs on the basis of anthropological, sociological and physiological studies instead of being interested in the process of technological change in strictly technical sense. More importantly, he prefers to focus on the effects of technology on economic and social life. He recognizes technological development to be the most effective inner dynamics in institutional/social and economic change. For Veblen, technology eventually alters the existing institutional order but this is a long run process, developing in cumulative causation. Analysis of institutional change consisting of cumulative sequences allows him to endogenize technology; to view technological and institutional change as intertwined and co-evolving processes and makes his analysis different from technological determinist approaches. This approach provides an alternative perspective to the view that sees technological and institutional explanations as competing interpretations of historical processes.

Furthermore, OIE, making a wider definition of institutions as 'habits of thought' blurs the boundaries between cultural and institutional explanations discussed separately before as underlying reasons for divergence among societies. The previous explanations were not satisfactory because of two reasons. First is that, their analysis about institutions is limited due to defining them as 'the rules of the game' and ignoring the constitutive impact of institutions on habits and frames of mind of individuals. Second is that, the scholars who claim that cultural differences are at the roots of different technological and economic performances of societies and explain even the ability to establish more conducive economic institutions with the different deeper cultural values, fail to reveal underlying causes of cultural differences. The impact of material conditions on the evolution of culture (synonymously on the evolution of institutions of a society) is only emphasized by Veblen among all those different approaches. Veblen, for instance, explains distinctive materialism of English society by the impact of machine technology on culture. As we have seen before, Landes appreciates the rationality of European community and explains it by the 'deeper cultural values' of Europe, but he does not bother to explain the ancient sources of those deep cultural values. Mokyr claims that European positive attitude towards science owes a lot to the scientific culture that emerged there in seventeenth century. However, he does not explain the foundations of materialistic pragmatism which constitutes one of the two major contributors of technological creativity in Europe.

In addition to Veblen's comprehensive analysis of technological and institutional/social change, in the second chapter I also discussed the issue of

divergence from the perspective of another original institutional economist, Clarence Ayres. Ayres who refuses any preconception about alleged inappropriateness of Chinese culture to technological change, based his explanation of divergence on three elements that can be labeled as geographical, technological and institutional. Another scholar whose theory of social change is partially incorporated to this discussion was Karl Polanyi. Polanyi suggests that, in contradistinction to Veblen as well as Braudel and some other scholars, the Industrial Revolution brought about an immense break with the past due to the commodification of labor, land and money. Despite this substantial point of divergence among them, I did not hesitate to mention his theory alongside the original institutionalist analyses, because Polanyi provides a successful example of theory of social change, emphasizing inseparability of different aspects of human life namely technological, cultural, economic and social.

To conclude, the much debated issues of economic history are still open to new contributions and the current perception about world history is destined to change by every new answer to the questions that have been preoccupying economic historians. The Original Institutionalism as a fertile ground for new interpretations and its potential implications for all the well-known questions of economic history are waiting to be re-discovered by economic historians.

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