



# Invention, Institutional Change, and Economic Development: From Scottish Enlightenment to the IPE

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## 3.1 INTRODUCTION

Since the start of the Industrial Revolution in eighteenth century, many economists have extolled the need for constant innovation; however, many others have pointed out the risks of innovation. Jeremy Bentham started this debate when he published his letter to Adam Smith in 1787 under the title *Defence of usury*. For Bentham (1787), usury or the high rate of interest, fosters innovation, since the innovative and the saver spirits arise from different inclinations that do not have to come together in the same

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person. Then, innovation must go hand in hand with credit. Innovation is the driving force behind development because “what is now an institution was once innovation” (Stark, 1952, p. 355). For Bentham, designers venture into unknown paths by expanding the scope of consumer utility (Trincado, 2005). Bentham praises the designer for breaking away from routine patterns of behaviour, standing out from the crowd, and viewing risk as a “pleasure” (Dube, 1991, p. 97).

The topic of the interest rate had already generated copious literature. Sir Josiah Child (1689) was in favour of lowering the legal interest rate, arguing that high rates encourage the rich to live without working and not to invest their wealth productively. William Petty (1690) considered it futile to try to fix interest rates by law; and many since the late seventeenth century suggested that interest rates were determined by the supply and demand of capital: North (1691), Barbon (1696), Massie (1750), Turgot (1766), Hume (1964c). For example, David Hume showed that while trade develops, the extension of business professions engenders love of profit; and the income received by the merchant (compared to that of the lawyer and doctor) promotes an increase in production (Hume, 1964b, p. 326). By treating these elements in historical perspective, in *Of Public Credit*, evoking Cicero he made a pessimistic prediction about the inevitability of the rise and fall of governments due to excessive public debt—although it was also optimistic about the inevitability of its resurgence. This precludes the possibility of major political or institutional reforms. Although change is desirable, it should not be at the expense of the past, since institutions and the habits of individuals come into play. These are products of human invention, not super or subhuman forces that gradually develop their effects in history (McRae, 1951). A wise magistrate should only make gentle innovations within the old constitution and its pillars so that learning through trial and error occurs naturally (Rotenstreich, 1971).

As against Hume’s ideas, for whom the crisis can be an opportunity for learning—only reasonable investments will survive the progressive mechanism of trial and error—Smith considers that the error, which in capital markets may lead to the non-payment of loans, can create resentment. Smith advocates usury law and the setting of a legal maximum interest rate a little above the minimum market price customarily paid by prudent men. If the interest rate is higher, only *prodigals* and *projectors* would take loans, and the idle creditor would take advantage of the former while the latter loses the capital accumulated with the effort of his savings. Maintaining

low interest rates—or achieving mild inflation—is for Smith an insurance against credit default (Trincado, 2023). Smith intended to dissuade men from taking out consumer loans, since the person who asks for subsistence cannot ensure a repayment in the future unless he loses his freedom (Smith, 1988, pp. 450–451). Thus, Smith speaks of a positive freedom that can be lost in the exercise of the negative freedom, that is, without any interference at all. However, it is not to be ignored that for Smith, the dynamics of transformation of institutions also affects innovation and economic and human development. For Smith, institutions sometimes seem like restrictions on individual action; but, as was the case in the Scottish Enlightenment, sociability is not a by-product that restricts individual action. Rather they apply the maxim of Ortega y Gasset (1914) of “I am I plus my circumstance; and, if I do not save it, I do not save myself.” Personal identity is not only a habit or desire of the isolated man but also the circumstances, the reality that men share and that enable them to change the world. For Smith, it is not the greatest individual inventiveness that increases the amount of capital, but the skill, dexterity, and judgment with which work is customarily done. For this reason, he gives importance to the role of capital—physical and human—based on abstinence (Khan, 1954, pp. 337–342).

In fact, in the period of the Scottish Enlightenment, other economists put forward a non-individualistic vision of innovation. For example, John Rae defended invention as a key element of technological and institutional change, on which economic development depends (Hamouda & Omar Lee, 2005). Rae considered that credit leads to institutional change that, as Bentham would put it, transfers the possibilities and capacities of action from the accumulators by abstinence to the creators and transformers of reality. In development theory, Rae’s view is related, in its most favourable version, to Amartya Sen’s theory of capabilities, and in its most unfavourable view, to Berlin’s idea of positive freedom, which he himself linked to authoritarianism of collectivities (Cohen, 1960).

This idea of expansion of capacities has entered into the recent developments of the institutionalism approach at the hands of Institutional Political Economy by authors such as Hodgson, Lazonick, Evans, Rutherford, Burlamaqui, and Toye, among others, with a broader vision of institutions and a more systematic and general explanation of institutional change (Chang & Evans, 2005). As for ECE, institutions contain rights, obligations, and ideologies, their success or failure must be evaluated according to their own objectives (Lazonick, 1991). The idea of

institutional innovation rejects the concept of equilibrium in favour of the process. The theory of Elinor Ostrom (Delgado, 2015) is also in this line, as it shows that the market and the state are nothing more than the face of the same coin where limitations and skills are intertwined, contrasting with Robbins' idea of scarcity.

For all these reasons, this chapter relates the pioneers of the study of economic innovation with current theorists on institutional change and economic development, who have a non-individualistic vision of innovation promoted by the institutions.

### 3.2 THE CONCEPT OF INNOVATION IN THE BRITISH ECONOMY OF THE EIGHTEENTH CENTURY

As Galindo (2008) claims, classical economists do not normally use the word “innovation,” but they prefer terms such as “mechanical advances,” “inventions,” and so on. David Hume linked the progressive march of science and civility with innovations in industry: “We cannot reasonably expect, that a piece of woollen cloth will be wrought to perfection in a nation, which is ignorant of astronomy, or where ethics are neglected. The spirit of the age affects all the arts; and the minds of men, being once roused from their lethargy, and put into a fermentation, turn themselves on all sides, and carry improvements into every art and science” (Hume, 1964c, *Of Refinement in the Arts*, 270–71).

However, for Hume, innovation in industry is a consequence, not a cause of competition and the accumulation of capital. In fact, Hume raised his theory of real interest within his general objective of establishing the temporality of causes (Trincado, 2019). Indeed, forcing down the interest rate and the rate of profit is for Hume a consequence of growth, not its cause; luxury is a consequence, not a cause, of wealth, and, in the same way, innovation is a consequence of competition and capital accumulation, not its cause (Schabas & Wennerlind, 2020, p. 45). Hume leaves innovation in the hands of the entrepreneur who he compares to the hunter, whose pleasure consists “in the action of the mind and body; the motion, the attention, the difficulty, and the uncertainty” (Hume, 1964a, p. 226). For Hume, businesspersons need action, they are restless, and they cannot rest for a long time without falling into a state of languor (Trincado, 2009).

For Hume, action in the economic sphere stands on three different motives: action for its own sake, habit, and imitation. The first two, action

and habit, can be considered constant over time (Trincado, 2009). Therefore, it is imitation what promotes differential growth between historical stages, stimulating the entrepreneurial spirit or imitative demand. “Commerce increases industry, by conveying it readily from one member of the state to another, and allowing none of it to perish or become useless” (Hume, 1964b, p. 325, *Of Interest*). But Hume considered that any attempt at political innovation must take into account the need to maintain the necessary conditions for a civilized coexistence (Gill, 2000, pp. 87–108).

Violent innovations no individual is entitled to make: they are even dangerous to be attempted by the legislature: more ill than good is ever to be expected from them: and if history affords examples to the contrary, they are not to be drawn into precedent, and are only to be regarded as proofs, that the science of politics affords few rules, which will not admit of some exception, and which may not sometimes be controuled by fortune and accident. (Hume, 1964c, p. 478, “Of the original contract”)

According to Hume, we must assess institutions for their survival. He points to tradition as a moderator of the possibilities of reason, a means of institutional learning based on an evolutionary epistemology (Gauthier, 1979, pp. 3–38.). This implies a path dependency; therefore, Hume seeks the historically fixed or invariable psychological foundations of human nature, and from uniformity arises his concern for consolidating politically and socially a high civic morality (Phillipson, 1979, p. 140).

According to Hume, as above said, the interest rate is a consequence of the advance of the economy, of the dispositions towards frugality and investment, and of the accumulation and distribution of capital. Therefore, he adhered to the law of the decreasing rate of profit in *Of Public Credit* (Hume, 1964c). Hume and Smith agreed on this point. Considering interest rates as a product of economic growth, Hume’s theory gives great importance to the influence on the interest rate of the concentration of capital in the hands of the rich while trade and industry develop. Hume believed that technological diffusion and the international factor flows makes poor regions benefit more when they trade with rich ones (he was thinking on the effect of the union of England and Scotland, Berdell, 1996, pp. 107–126). For him, the main benefit of trade is the international diffusion of technology. However, in the case of rich countries, not only their interaction spreads technology but it also gives an impetus to

the overall rate of innovation. Relating this to Hume's science of man and the role he gives to imagination, technical change is shown to increase knowledge and changes customs, conventions, and laws (Norton, 1993, pp. 148–182). Thus, his theory of interest proves that the phenomenon can be reduced to changes in manners and customs, an argument that forces us to accept that the interest rate can be used as an instrument of economic policy, helping to produce changes in spending and saving models that lead to a fall in the interest rate (Trincado, 2005).

Although Hume witnessed and recognized the rise of the consumer society, he was unable to understand the extent to which the British economy was to grow during the last third of the eighteenth century, becoming the Workshop of the world (Schabas & Wennerlind, 2020). For example, he noted the importance of wool, linen, and silk, but not the increased production of cotton cloth that occurred in the 1780s, largely facilitated by the steam engine. In 1752, he could not anticipate the dramatic changes that were coming, something that neither Adam Smith could foresee in 1776. In fact, the use of steam only came after the improvements of James Watt and Matthew Boulton in 1776. In this sense, Hume and Smith analysed a proto-industrial commercial world in which artisanal production tended to take place on a smaller scale without additional sources of energy.

All the crises of the time, despite the economic prosperity, led both Hume and Smith to express their concern about the emergence of an idle rentier class that lives by giving credits (Trincado, 2023). They recognized that credit markets tend to create an imbalance of power such that modest lenders and borrowers are more likely to be at the mercy of those with large sums of capital. Both Hume and Smith articulated the prediction that in the event of a collapse of public credit, the majority of the population would be in debt to a small but powerful group of financiers. Smith expressed great faith in the frugality of common people, and therefore blamed any credit fiasco on the extravagant spending misconduct of landowners, bankers, and politicians (Smith, 1988, 1, pp. 345–47).

In this sense, Smith is especially critical of the figure of the greedy *projector*, and compared to Hume, for whom the crisis can be an opportunity for learning, Smith considers that the error can create resentment in case of non-payment of the loans, and the resentment, dissolution. It is not to be forgotten that justice, according to Smith, emerges from the propensity of a spectator of offences to feel resentment or indignation (Trincado, 2004). Smithian moral theory of sympathy underlies Smith's economic

theory of innovation, which in this sense can be considered an alternative theory based on Responsible Innovation. Individuals create useful innovations because they are constantly imagining themselves in other people's shoes (Hühn, 2018). The division of labour leads men to put their abilities in common for the public good.

Among men, on the contrary, the most dissimilar geniuses are of use to one another; the different produces of their respective talents, by the general disposition to truck, barter, and exchange, being brought, as it were, into a common stock, where every man may purchase whatever part of the produce of other men's talents he has occasion for. (Smith, 1988, I, ii, 30)

Adam Smith tended to ignore the historical and psychological influences in his treatment of political economy. For Smith, natural freedom is beyond utility; the natural is opposed to the historical, as men are not determined by history or conventions (Griswold Jr, 1999, pp. 349–354). Smith argues that there is no reason why all groups should not always be equally frugal, because people rely on their “universal, continual, and uninterrupted effort to better their own condition” (Rotwein, 1970, p. 109, Berry, 1997, pp. 68–70). Smith's growth arises from the natural tendency to increase productivity because of the division of labour, with progress in one sector being a prerequisite for progress in others (Berg, 1994). According to Smith, continued growth is necessary to unleash the rivalry between the captains of industry. And the effort to improve one's condition, protected by law, and permitted by liberty to be exercised to the most advantageous manner, is “which has maintained the progress of England towards opulence and improvement in almost all former\_ times, and which, it is to be hoped, will do so in all future times” (Smith, 1988, II, iii, p. 345). It may be necessary to adjust the legislation to the interests and temperaments of the time, but Smith presents habit and prejudice only as an obstacle. Therefore, Smith considers productivity as an essential factor, the result of specialization that allows workers to increase their skills (García Leonard & Sorhegui, 2018). There is expansion of production if productivity increases, and the machinery invention flows from the skills and abilities of workers, product of specialization and division of labour, and thanks to manufacturing secrecy. Thus, Smith introduced the problem of knowledge and the learning abilities for the development of technology, basic pillars of the current concept of innovation. For Smith, the only means of promoting inventions is by creating an intellectual

property right for a reasonable time, without which they would be discouraged (Smith, 1978: LJ (B), 175: 472, 1109).

Thus, for Smith, the division of labour is an innovation that occurs unintentionally and gradually, and no larger share should be forced into any channel than would naturally flow into it spontaneously. Entrepreneurial risk seeking innovations can only pay off temporarily, as shortly other firms will take over the innovation and competition will reduce the profit margin (Smith, 1988, p. 173). Smith places more emphasis on the automaticity of the market in restoring the balance than on the importance of the innovative function. For Smith, the man of progress, slowly but surely, carries out his projects with enough information. Therefore, what increases the amount of capital is not the exceptional man, but the ability, dexterity, and judgment with which the work is usually carried out, besides the parsimony or abstinence (Khan, 1954, pp. 337–342). In this way, even the invention becomes one more specialty. “These different improvements were probably not all of them the inventions of one man, but the successive discoveries of time and experience, and of the ingenuity of many different artists” (Smith, 1988, Early Draft of Part of the Wealth of Nations, para. 18, 570). The inventor is a worker who, by continually using a machine, imagines a new means to reduce his labour and improve the mechanism. “And there is none of the inventions of that machine so mysterious that one or other of these could not have been the inventor of it” (Smith, 1978: LJ (A): VI: 4: 346).

According to Ricoy (2005), in Smith, the invention and use of machinery in the different productive activities depend, first, on the progressive specialization and simplification of its operations that result from the extension of the division of labour. “As the operations of each workman are gradually reduced to a greater degree of simplicity, a variety of new machines come to be invented for facilitating and abridging those operations” (Smith, 1988, p. 292). Secondly, technical progress, the invention of new machines and the improvement of existing ones, is the result of (technological) learning by doing and the effective use of machines in production processes. This is, in turn, a consequence of the progressive subdivision and specialization of the processes that the division of labour creates that leads some worker to find easier and more direct methods to carry out their work (Smith, 1988, p. 13). Following Smith’s idea, James Steuart (1767) pointed out not only to the positive effects that mechanization would have on employment due to lower prices but also to the negative effects on unemployment of the introduction of machinery that



replaced workers (Mokyr et al., 2015; 33–34). Ricardo expresses himself in the same vein (1821, pp. 388–39; Mejía, 2017). However, among other things, the fact that innovation is the consequence of a social process delegitimizes the maximization of the value for shareholders as the business objective. For this paradox of illegitimate and non-sympathizers stockholders, Smith did not trust governance through corporations. For Adam Smith, innovation is not the consequence of the individual invention of great geniuses, but of the progressive change of institutions. In this sense, this perspective of Smith that pervades the classical economists allowed them to articulate a critique of the conservatives who, in the nineteenth century, called classical economics the “Dismal science.” The historian Thomas Carlyle praised the deeds of great heroes as history makers, but spoke of capitalism as a way of “benevolent slavery” of the ungovernable mass and offered racial explanations for unemployment. In addition, he praised the idea of the nation and social policies of the government as a benevolent master of workers (Levy, 2001).

Adam Smith’s vision is present in recent studies such as those by Collier (2019), Mazzucato (2019), and Mayer (2018), for whom the generation of innovations is a collective process that must be reflected in payment and governance. The value that the companies provide to society is not only the quantifiable price of their product but dynamism and growth created. In addition, Smith denounces the excessive financialization of the economy that leads to living on income or subjects the economy to uncertainty. He certainly would not have celebrated the hypertrophy of the financial system or the excess of rent-extracting activities. The deterioration of wage income compared to benefits, synonymous with economic decline, is the sign for Smith of a lack of dynamism (Sebastián, 2022, 187–8).

In *Defence of Usury*, Jeremy Bentham wanted to criticize Adam Smith by boasting of being more liberal than Smith himself was. Capping interest rates, says Bentham, will decrease the number of potential lenders and bankers will be more cautious in setting risk margins or a black market for credit will emerge. Loans will only be granted to entrepreneurs who operate in known production and distribution paths, with low risk. Thus, Bentham considers that the effect of law will be to block any innovation and the development mechanism itself, as he defined it. His conclusion is that it is necessary to trust market forces and deregulate the economy. Bentham reproached Smith for having underestimated the role of those “men of genius” who, through their invention and imagination, are responsible for the progress and wealth of nations, since they find new

channels of trade. In this case, he extends his utilitarian habit of projecting into the future to businesspersons' activity. Even if their companies fail, society as a whole remains intact because others will try to avoid making the same mistakes and the innovations introduced by projectors in the production process will expand through the economic system, whatever the fate of its original promoter—in short, it is the argument of trial and error. Therefore, productivity will increase by new arrangements of the means of production, especially in manufacturing, and of growth by abrupt changes, based on uncertainty, typical of disruptive innovation and contrary to Hume's or Smith's vision (Kline & Rosenberg, 1986).

### 3.3 INNOVATION AT JOHN RAE

After the death of Adam Smith, Scottish theory of innovation evolved in a very original way. In particular, John Rae, a Scotsman born in Aberdeen in 1796, published a *Statement of Some New Principles on the Subject of Political Economy* in 1834, in which he presented a sociological theory of capital. John Stuart Mill (1848, 72, Book I, Ch XI) quotes him in *Principles of Political Economy with Some of Their Applications to Social Philosophy*. For Rae, growth is function of innovation, and Smith was confusing effects with causes (Coccia, 2017). Smith held that division of labour leads to the creation of new machinery and therefore to inventions, Rae held that it is inventions which lead to the division of labour. For Rae, invention is the only independent cause of wealth and income growth, and all other factors, including accumulation, are simply their consequence (Brewer, 1991). Rae charges Smith with attributing economic growth solely to capital accumulation, which in turn depended on individual saving decisions. According to Brewer (1991), Rae was the first economist to see technological change as the main cause of economic growth. Savings are invested but they are not an exogenous variable, just like population and invention. In Rae's opinion, invention itself does not promote thrift; its causes are independent of individual decisions and are open to the influence of the legislator. Thus, he supported protection on the infant industry and believed that progress in science and technology should be supported by the funds from tariffs on the imports of luxury goods as a way to increase savings. Rae tried to put together a knowledge-based theory of growth, that is, an endogenous model of growth. So, he began to talk about the learning process, which over time has become one of the cornerstones of the evolutionary theory of economic change. (Nelson &

Winter, 1982, 2002). Rae's theory of capital had a strong influence on the Austrian Economics school (Roll, 1954).

John Rae has been recently rediscovered not only as a true precursor of endogenous growth theory but also for his contribution to understanding the economic role played by innovation and technological change within the economic system. Rae distinguished (like Bentham) men of genius from common people who were characterized by a natural inclination towards imitation (according to Hume, the differential factor between historical stages). However, Rae also considers the scarcity of certain materials and the application of principles from already known fields or principles to new fields to be the cause of the progress of invention, generating synergies thanks to cross-fertilization phenomena. Therefore, invention arises from science and necessity. According to Rae, this effect, as well as technological progress, is easier where there are constant commercial and financial relationships between men belonging to different cultures. Thus, he proposed a multi-ethnic environment similar to the global village. Finally, according to Rae, there must be social changes capable of shaking the immobility of the systems and stimulating the inventive and creative faculties of men to find a momentum towards development. In this sense, Rae talks about the spatial diffusion of innovation from one country to the other where there are different cultures, climates, and socioeconomic conditions. There have not only been incremental improvements due to technology in relation to products but also in relation to services, such as banking trade. It needs to be said that the origins of the economics of technology is assigned by Grandstrand (1994) to Babbage's work written in 1832, two years before Rae's work. However, Babbage's analysis followed mechanical principles with an engineering twist, examining the improvement of division of labour and increasing economies of scale from the application of machinery to manufacturing (Rosenberg, 1971), while Rae's writings had a strictly economic focus related to growth. As we can also see, Rae tries to link Hume's historical vision with Bentham's psychological theory to overcome Smith's mechanistic explanation, which, however, surpasses Bentham in his non-individualistic perception of innovation.

### 3.4 SUBSEQUENT HOLISTIC VIEWS OF INNOVATION AND HISTORICAL CHANGE

Subsequently, the authors of the German Historical School (Adam Müller, Wilhelm Roscher, Bruno Hildebrand, Karl Knies or Gustav Schmoller) gave a meaning to history other than the sum of its parts, which states that economic laws are not absolutely and permanently valid. For historicists, history, science, technology, and innovation depend on multiple causes, not only economic but also political, sociological, or psychological. They had an organic and biological approach to social sciences based on the statistical method, in contrast to the individualist vision of philosophical and social problems that classical economics presented. Schmoller insists that we should not deduce general rules from reason, as “Manchesterian liberalism” does, but we need to record the “unique” in its infinite historical variation. We can only make a probabilistic analysis from its occurrence, a sociology of the historical spirit (Cardoso & Psalidopoulos, 2016).

In England in the nineteenth century, a British historicism also arose as a critique of classical economics. Richard Jones, John K. Ingram, T. E. Cliffe-Leslie, Walter Bagehot, or Arnold Toynbee were based on Auguste Comte’s theories that described social change heading towards a predictable end. British historicism tried to support the theory with statistics, bringing economics closer to sociology. Jones insisted on the evolutionary character of national economies. Similarly, Bagehot claimed that classical economic theory was not of general applicability and that, given institutional differences; it was of no use outside England. In fact, in North America, classical economics did not catch on very much. The American Economic Association was based on a branch of British historicism, Veblen’s institutionalism, which studied the interrelationship between institutional structures and the economy. Borrowing from Spencer the idea of quasi-random evolutionism, Veblen considered that the end of history was not predictable and the different historical stages were not comparable. Institutions seal human beings with preconceptions of time and place, which depend on the constantly changing technological system. Therefore, man is not a rational homo oeconomicus equal at all times, but he is curious and creative, although also accommodating and vain. The theory is based on behaviourism, on instinct and on the habits that institutions generate (Veblen, 1899). Nevertheless, according to Veblen (1904), a gradation of institutions may be done. In particular, institutions are of two types: technological and dynamic; or ceremonial

and static, which are dependent on the former. Veblen saw industry as progressive for society and culture and a technological characteristic of it; and business as a ceremonial and inhibitory institution to society and culture (Klosterman, 2016). The first determine preconceptions and generate progress and innovation; the latter block progress. The former depend on science, on the producers or engineers who invent cheap technology and determine economic and social relations based on the instinct of workmanship and idle curiosity, or pursuing knowledge for its own sake. The second are the entrepreneurs moved by the instinct of emulation and mere self-preservation. Armed with their property rights, they boycott the introduction of inventions, creating monopolies and increasing production costs to keep profits high. In this sense, Veblen anticipates the theory of regulation and criticizes the relationship between entrepreneurs and government, who agree to protect their interests at the expense of the public. Veblen created an important heterodox school in the United States, with followers such as John R. Commons, Wesley Mitchell, John M. Clark, Clarence Ayres, and John Kenneth Galbraith (Trincado, 2014). Commons proposes to establish a legislation for social change with the new notions of transaction, collective action (especially union), and conflicts of interest. Mitchell bases the dynamics of capitalism on endogenous economic cycles that lead to recurring crises. Finally, Ayres talks about technology as an element that overcomes superstition and transforms sociocultural institutions.

### 3.5 FROM INNOVATION AS A RATIONAL PROCESS TO THE ECONOMICS OF INNOVATION

Although classical economists do not link invention to the figure of the businessman and Ricardo points out the problem of technological unemployment, many classical economists have a positive perception of the invention. Jean Baptiste Say supports in the momentary imbalance notion, the introduction of machinery in industry. Machinery saves labour and increases production and, in his opinion, it does not harm employment, except in the case that capital remains idle, as it creates activity in another industry. In a nation in the midst of the capital accumulation phase, the invention of new machines has few drawbacks, since although the labour force increases, the new capital offers them the means to employ themselves. Classical economics revealed that the new technology resulting

from inventions had effects on labour productivity and economic growth, and that the latter did not depend solely on the three productive factors (land, labour, and capital), as it would later be generalized by the neoclassical school. For neoclassical economics, technological change is the result of the rational agent's choice among a set of scarce resources in order to maximize benefits. For neoclassical economics, technology is the flow of information and knowledge that can be applied to the production of goods and services, based on possible production plans suggested by engineers. The economic problem consists of choosing the best combination of means to obtain the maximum number of products, with technology as an exogenous factor in the process (Gallego, 2003).

For this reason, models where technology is an exogenous factor had to move to models of endogenous growth closer to the pioneers of the eighteenth century. In particular, there are two major trends in technological change in the second half of the twentieth century, which have led to the construction of exogenous and endogenous growth models. The neoclassical models of exogenous growth (Solow, 1957) consider that the variables included in them must be exogenous and technology is a residual variable of the model. Solow (1957) questions the fundamentalism of capital as a magic word for development. He stated that technological change was what explained most of growth, and advanced the idea that "improvements in education of labour force" would be considered as technical change.

In the endogenous growth models, concepts such as learning and increasing returns to scale are introduced. Economic growth draws from the existence of externalities linked to investment in physical or human capital. In this sense, they break with the traditional neoclassical models of growth and maintain that growth is driven by technological change, which originates from "an intentional investment decision made by agents to maximize their utility" (Romer, 1990). The most recent studies on the role of innovation in the growth process include aspects such as "learning by doing" (Romer, 1994), human capital (Lucas, 1988), research and development (R&D) (Romer, 1990; Aghion & Howitt, 1997), and public infrastructure (Barro, 1997; Galindo, 2008; García Leonard & Sorhegui, 2018; Jimenez-Barrera, 2018; Olaya, 2008).

The economics of innovation and technological change or neo-Schumpeterian economics arises from various schools of thought such as the above-mentioned theory of endogenous growth, but also the new institutional economics, evolutionary economics and, above all, the

theoretical approaches of Joseph Schumpeter on long-term business cycles to explain the relationships between innovation, technological change, and economic development (Parayil, 1991). These approaches began in the Böhm-Bawerk seminar of 1905–6, where Emil Lederer, a friend of Schumpeter at the University of Vienna and influenced by Marx, also presented a theory of cycles based on dynamic disequilibrium that suggests that it is the excessive speed of technical progress which produces technological unemployment (Benchimol, 2019; Hagemann, 2015). Also, according to Michał Kalecki, capitalist investment entails innovation in profit and in the power that affects the evolution of economic cycles (Courvisanos, 2012).

According to Schumpeter, innovation and industrial change are clues in the field of economic analysis. Innovation is the engine of economic development and the main cause of the cyclical fluctuations. Both growth and the cycle are inextricably linked with the capitalist mode of production understood as an evolutionary process of continuous innovation and creative destruction. The innovative entrepreneur is the key figure in the innovation process, who alters the course of the circular flow by reforming or revolutionizing the modes of production introduced by an invention (García Leonard & Sorhegui, 2018; Jimenez-Barrera, 2018; Schumpeter, 2010; Yoguel et al., 2013). Schumpeter's theory of economic development is based on Innovation processes and sociocultural changes (Quevedo, 2019). In his *Theory of Economic Development* (Schumpeter, 1934), he stresses the importance of the social environment in which the entrepreneur carries out his activity, the “social climate”, which includes aspects of a sociological, institutional, and economic nature (Galindo, 2008; Nissan et al., 2012).

In the early 1980s, Nelson and Winter (1982) vindicated Schumpeterian thought and explained competition within an innovative environment as a change in routines through the integration of incremental innovations. Technological change explains, in their opinion, the long-term structural evolution. Based on a dynamic, evolutionary, and essentially qualitative approach, they put a lot of weight in institutions, since they can speed up or slow down innovative processes. The existence of technological revolutions, like a gale of creative destruction, leads capitalism to overcome the recessive phases of the economic cycle, and to readjust the socioinstitutional framework with the techno-economic paradigm (Jimenez-Barrera, 2018). The object of study of the evolutionary conception of technological development is economic change, in the short and long terms.

Evolutionary economics applies to the field of economic science a plurality of possible evolutionary paths, given that agents act in a framework of uncertainty similar to that of biological evolution. On the other hand, evolution can be guided by economic policy measures, which modify the context in which they operate (Espinosa et al., 2021).

The evolutionary line of the neo-Schumpeterian trend of innovation economics questions the neoclassical postulate of equilibrium and rejects the production function as an instrument to delimit the state of technological knowledge, as they deny that companies have at their disposal a panoply of techniques. Despite the fact that “evolutionary economics” uses analogies from the natural sciences, as Hodgson (2004) emphasizes, the term describes a wide variety of points of view and approaches, some of which do not use such analogies, and proposes a not “deterministic” or “mechanistic” vision of the Darwinian theoretical approach. Evolutionary theory understands technological change as a product of the process of variation and selection, and not as a rational choice process, that assumes technology as given. In the words of Lewis and Steinmo (2011), it provides a good meta-theoretical framework to understand the institutional dynamics and the mechanisms of gradual change. From this, we can trace an evolutionary macroeconomics, which is based on the post Keynesian theory of credit and money creation by banks, that is, on endogenous money. So, Keynesian monetary policy does not work as a stimulus for investment, innovation, and structural changes (Sawyer, 2020). Neoclassical policies on science, technology, and innovation do not seem applicable to developing countries as against evolutionary theories that take into account path and theoretical pluralism (Dolfma & Seo, 2013; Moreau, 2004). Nevertheless, it seems that both policies tend to converge, even though their basis is different (Ghazinoory et al., 2017). In this sense, evolutionary theory of growth is another scientific research programme in the sense of Lakatos (Silva, 2009).

On the other hand, the emergence of new productive ideas is not something external to growth models, but rather depends on economic incentives that, in turn, are determined by institutional contexts. Hence, North’s contribution, which lies in emphasizing that institutional public policy, is an essential determining factor for growth and that political changes condition the incentives of economic agents to develop new ideas. For North (1990), the “institutional framework” is determinant in the long-term functioning of the economy. North (1990) argues that neoclassical theory emphasizes technological development and human capital



investment, but ignores institutions and time. In the static world of neo-classical theory, the exchanges happen without friction, property rights are perfectly delimited and information has no costs, so we cannot analyse development policies within this framework. To understand the differential performance of economies over time, North examines the nature of institutions and their consequences for economic or social performance, outlining a theory of institutional change. In his opinion, institutional change is the result of the interaction between institutions and organizations in an economic framework of scarcity and competition. Competition forces organizations to invest constantly in knowledge in order to survive. The institutional framework provides the incentives that encourage the type of skills and knowledge perceived to yield maximum rewards; perceptions are determined by the mental structures of the players. Economic change is a ubiquitous, continuous, and cumulative process that results from the different individual decisions of actors and businessmen of the organizations.

McCloskey (2017, 2018, 2020, 2021; McCloskey & Silvestri, 2021) has recently refuted developmental neo-institutionalism. She considers that the most feasible cause of the “Great Enrichment” that occurred in the Netherlands and Great Britain, and was later spread to the rest of the world, is the change of the ideological change, which is actually the so-called liberalism. To build on that idea, Professor McCloskey stresses that the liberation in ethics and ideology produced Innovism, not ‘capitalism’, which was a long-standing phenomenon. By Innovism, she means the accumulation of ideas, not of capital, hence the sequence she proposes is that liberalism led to Innovism and, therefore, to the Great Enrichment.

In recent years, New institutionalism has gradually reconsidered their concept of institutions, taking them as embedded in the broader institutional milieu of a political organization, as a “social regime” constituted by a set of rules that define behaviour. There is also a broad consensus that institutions, ideas, and the environment change in a coevolutionary process (Hodgson, 1993, 2000; Lewis & Steinmo, 2011). For complexity theories, innovation is the result of a transforming process of social institutions defined as emerging patterns of human interaction (Guia et al., 2009).

From another perspective, and with a clear Marxian resonance, the Regulation Theory proposes an institutional explanation of the transformations of capitalism, underlying the interpretative function of the class struggle for the role of institutions and “social commitments.” The theory tries to explain capitalist reproduction by emphasizing the influence of the

changes in the functioning of political regimes, and by studying the incidence of the institutional context in innovation (Boyer, 1988). For Katz (1997), however, the Marxian institutional explanation of technological change is insufficient, as it only emphasizes the influence exerted by political and social organizations on economic activity and not on the laws of capitalism. In his opinion, technology is a social productive force, which acts through innovations subject to the contradictory dynamics of the laws of capital, hence the fundamental role of class struggle in technological change. In short, he says, if the role of class struggle is taken by the role of institutions, as defended by Regulation Theory, the social meaning of innovation is distorted. Indeed, as various authors have underlined, in Marx's theory, technological change and class struggle are the driving force of historical change. The Marxist school analyses technological change as part of the qualitative development of the productive forces, within current production relations, closely linked to the laws of accumulation and surplus value. The development of technology is a way to increase surplus value, increase capitalist benefits, and maintain the expanded reproduction scheme, which shows the endogenous nature of technical progress (Elliot, 1980; García Leonard & Sorhegui, 2018). In this sense, technology makes us evolve to a cognitive capitalism, to a common intellect capable of overcoming the contradictions of the previous mode of production (Vercellone, 2007).

### 3.6 INNOVATION, INSTITUTIONS, AND DEVELOPMENT: THE APPROACH OF THE INSTITUTIONALIST POLITICAL ECONOMY

We end this chapter by focusing on a school that we consider to have great projection since it includes part of the ideas raised by classical economists but solves some of the problems that arise from their theory, Institutional Political Economy (IPE). The IPE proposes an analysis that goes beyond the conventional view of institutions as “constraints” and a more systematic and general explanation of institutional change (García Quero & López Castellano, 2016). Individual motivations are fundamentally formed by institutions that surround the individuals, but human motivations are varied and interact with each other in complex ways. There is no need for selfish motivations to dominate behaviour in the public sphere of the state, and even in the private sphere the importance of self-seeking

motivation is much less than what neoclassical economics believe. For the IPE, institutions are more than restrictions; they are “constitutive,” because they inculcate certain values, and “enabling” instruments. Institutional change, for its part, implies a change in the rules that constrain or encourage social behaviour and a transformation of the visions of the world (Chang & Evans, 2005).

The IPE, unlike the so-called neo-institutionalism, is very close to Classical Political Economy, but also to the German Historical School and the Old Institutional Economics. From the German Historical School, the IPE draws its critique of abstraction, the deductive method, and the idea of individual interest as a regulator of economic action from the neoclassical school. He also shares Schmoller’s idea of an interventionist State in social matters, guarantor of the principle of redistributive justice. From the old institutionalism, amplified by the work of John K. Galbraith and Gunnar Myrdal, and recent studies by Geoffrey Hodgson and William Kapp, IPE draws its emphasis on studying the structure and functioning of economic systems and processes, the use of historical and empirical material, the critique of the idea of equilibrium and of the utilitarian behaviour of the individual and the methodological individualism of neoclassical economics.

IPE also has a certain affinity with evolutionary or Schumpeterian economics, fleeing from simplistic models of rational individual behaviour and adopting a clearly interdisciplinary approach. From this view, later expanded by Simon, Nelson, and Winter, both Reinert and Lazonick adopt the argument that innovation is a fundamental element of economic development that implies certain routines, capabilities, and replication (Salter & McKelvey, 2016). For Lazonick (2006), neoclassical theory does not allow us to understand the innovation process. He argues that a framework of the innovative company integrated into comparative-historical analysis is needed so as to analyse the relationship between corporate governance and economic development and to know which institutions will promote or hinder innovation and development. Also, we need to define the concept of Development. If this is understood as a growth process capable of permanently raising the standard of living of an increasing number of people over time, the corporate governance institutions that in different times and territories fostered economic development must be made explicit. As Hoff and Stiglitz (2001) underline, development cannot be seen as a process of capital accumulation, but as a process of organizational change.

Precisely, the main limitation of the analysis by North and other neo-institutionalism economists is that they assume that the fundamental measure of development is income growth, estimated using market indices. For Evans (2004, 2005), Amartya Sen's approach to capacity allows an escape from this reductionist approach, because it emphasizes the institutions that facilitate choices on the goals of development. Based on the idea that without innovation, without investment in productive capacities, there can be no economic development, Lazonick (2006, 2011) argues that the design of public policies to shape processes and results of investment in innovation requires building an economic theory of "organizational success":

The theory of organizational success is based on two premises. The first is that the neoclassical description of the company is a non-innovative theory of the company, which makes it incapable of analyzing what kind of corporate governance institutions can promote innovation and economic development (Lazonick, 2006). The second is that investment in innovation is not a market process, but an organizational process carried out by three social actors (households, governments or companies), who invest in the human capital that constitutes the basis of the productivity growth necessary to achieve a higher standard of living (Lazonick, 2011).

A reflection on the relationship between innovation, institutions, and development requires, therefore, working out a theory of the innovative company and another theory of the investment of households, governments, and companies in innovation that goes beyond the conventional view of the role of public policy in mitigating market imperfections and failures. This new theory highlights the importance of households as centres of production of future workers, more or less qualified; the role of government in developing the future workforce by investing in and subsidizing the public education system, and creating new skills that can be vital for economic growth; and the work of the innovative company when integrating the skills and efforts of the workforce to undertake organizational learning processes that transform the available productive capacities and access new markets.

For a developing nation, the innovative firm theory coincides with the infant industry argument and tariff protection. For its part, the State model capable of investing in the knowledge base of a society coincides with the so-called developmental State, one of the institutions with the greatest role in reformulating the national trajectories of economic growth during the twentieth century (Chang & Evans, 2005). As Lu (2000)

showed for the Chinese case, the analysis of the complementary functions of the innovative company and the developmental State in the generation of economic growth is essential for a theory on the functioning and results of the economy.

### 3.7 CONCLUSIONS

In this chapter, we have studied the difficult emergence of a view of change and innovation from common knowledge. David Hume already introduced historical and psychological factors in his analysis, although he starts from a fear of dissolution, which points to tradition as a moderator of the possibilities of reason. Institutional learning is based on an evolutionary epistemology. However, the mechanistic vision could not be overcome with an individualist perspective since institutions are not only restrictions to individual action but rather they are the world shared by all men. Since the Scottish Enlightenment, an attempt has been made to establish these principles of non-individual change, first following Adam Smith's theory, who supposes that it is collective innovation and development, not the individual invention of great geniuses, which encourage the evolution of institutions. Classical economists, based on Smith's theory, were able to articulate a criticism on the conservative movement who defended "benevolent slavery." However, classical economists who consider invention as the key to development, such as Jean Baptiste Say or Jeremy Bentham, made their approach from the utilitarian and atomistic vision of human being—"methodological individualism"—which does not solve the problem of institutional change and common knowledge. John Rae, however, managed to introduce invention as a key element of technological and institutional change, on which economic development and the increase in human capabilities depend. This implies a new rethinking of "freedom in context." This idea of expansion of capacities is present in the historicists and the American institutionalism, and has entered into the recent developments hand in hand with Institutionalism Political Economy, with a broader vision of institutions and a more systematic explanation of change that rejects the concept of equilibrium in favour of the process.

Besides, classical economics suggests that the relationship between savers and investors can lead to an excessive financialization of the economy, subjecting the economy to uncertainty. From the Scottish Enlightenment, we see that the imbalance of power can lead to social imbalance and a collapse of public credit. In this sense, the proposals of Collier (2019),

Mazzucato (2019), and Mayer (2018) attribute the generation of innovations to a collective process and lead to a rethinking of governance problems where we need to reinforce justice and social inclusion. Social value is not the same with societal value and the ownership of companies. Development and growth are collective processes and natural justice in the retribution is basic to create the greatest incentive for innovation and creativity. In short, dynamism and innovation are subject to a general principle of social change, whose basis continues to be social responsibility, dignity, and indignation.

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