Gareth Dale, **Seventeenth Century Origins of the Growth Paradigm**, in Iris Borowy & Matthias Schmelzer, eds, *History of the Future of Economic Growth: Historical roots of current debates on sustainable degrowth*, Routledge, 2017.

The growth paradigm, as I understand the term, refers to the idea that 'the economy' exists as an identifiable sphere of society, that it possesses an inherent tendency to grow, that its growth is imperative, continuous (even, essentially, limitless), and that growth is an acknowledged social goal and a fundamental social good – even indeed the principal remedy for a catalogue of social ills.[1] One may question one or other element of this formulation but there is little doubt that a set of ideas of this type has been profoundly influential, across the world and for a long time. This invites the question: how long? When did the growth paradigm come into being? Out of what materials was it fashioned and by whom?

These are the questions explored in this chapter. It begins by surveying a sample of civilizations, including ancient Mesopotamia, India's Mauryan Empire, Tang-dynasty China and fourteenth-century Maghreb, in each case parsing documents and other evidence that provide insight into behavioral and ideological phenomena that, *prima facie*, resemble the modern growth paradigm. In each case, it is suggested, the differences outweigh similarities. The chapter then moves on to propose that, in close connection with the rise of capitalism and Europe's colonial land grab, a set of socio-economic, cultural and ideological changes conducive to the growth paradigm arose during the middle of the last millennium—roughly speaking, the sixteenth through eighteenth centuries. It charts the advent of a new conception of time: abstract, infinite and uniform, locked to the metronome of capital investment and increasingly connected to a social concern with quantification. It then examines the interconnections between three major developments that were unfolding in seventeenth century western Europe – maritime-colonial expansion, the scientific revolution, and the rise of capitalism (including, crucially, the ascendancy of the 'market paradigm' in economic thought) – and explores their relationship to early scientific economics and to the 'Eden project': the crusade to create paradise on Earth by means of 'improvement' and colonial plantation. These processes put wind in the sails of the idea of Progress and, simultaneously, facilitated the discursive construction of 'the economy' as an entity subject to law-governed

dynamics of growth. Clearly, in this short chapter I cannot analyze these transformations in any detail. Instead, I shall attempt to sketch them in broad brush strokes.

From Mesopotamia to the Maghreb

If one searches for evidence of the growth paradigm in documents from the ancient civilizations one comes away empty-handed. Consider for example Bronze Age Mesopotamia. One could be forgiven for thinking that all ingredients were present necessary to the emergence of something that would at least bear a resemblance to the growth paradigm. There were rulers who drove their subjects to work harder, as immortalized in the Epic of Gilgamesh (Sedlacek 2011, 21). There were markets and trading, acquisitively-minded individuals and the ability to amass wealth and to pass it on to one's heirs. There were sophisticated accounting techniques and a form of money, enabling different types of wealth to be rendered commensurable and their dimensions measured. Technological and scientific genius were evidently not in short supply. The Mesopotamians are credited with inventing agriculture, animal domestication and the seeder plough, glass, and of course the wheel (for pottery, later for chariots), as well as complex writing and arithmetic (to keep inventories of the secular and religious elite's possessions). They came up with the concept of zero, and the minute. They were, arguably, the first to construct towns, not to mention countless inventions and innovations in irrigation and sanitation techniques, in architecture (the arch, column, and dome), and in politics (the state, including two of its basic forms: the city state and the empire). This was in many respects a bustling and innovative society—but of the growth paradigm? No sign.

Skip forward to what the philosopher Karl Jaspers designated the Axial Age, the period from 800 to 200 BC that witnessed, more or less simultaneously in China, India, Greece and Persia, a flourishing of philosophical thought – broadly defined as the application of principles of systematic reasoned inquiry to the great questions of existence. What was it that occasioned this momentous eruption of critical inquiry? Greater literacy was one factor. Another, argues Richard Seaford (2013), was the spread of coinage (in India, China and Greece), and markets. These developments, David Graeber conjectures (2011, 237-9), fostered a "habit of rational calculation, of measuring inputs and outputs, means and ends" which found an echo in a "new spirit of rational inquiry."

Something of this spirit can be seen for example in documents from Greece and India in the fifth century BC. In India, the age of Buddha saw thriving urban economies, with merchant classes trading the agricultural and artisanal surplus, and the rise of the Mauryan Empire, initially under the leadership of Chandragupta Maurya. The Mauryan monarchy maintained a colossal standing army and a vast bureaucracy that enabled it to sponsor a major expansionary drive, constructing irrigation projects, founding new settlements, and encouraging *sudras* to settle as farmers on state-granted land (Thapar 1987; Harman 1999, 49-50). Chandragupta's advisor and minister, Kautilya, is thought to be the main author of a remarkable text, the Arthashastra.[2] Although normally translated as 'manual of statecraft,' in that it consists of advice to rulers, a more literal translation would be 'the royal road to wealth.' 'Artha' means worldly success in terms of power and wealth, and the Arthashastra is restricted to a special aspect of it: the enhancement of royal power and revenue (Habib and Jha 2004, 46). Much of it is devoted to spelling out the techniques of maintaining the royal household (such as revenue collection, and accounting), and certain passages have an arrestingly contemporary resonance. Kautilya (1962, 76) advises that the ruler should "facilitate mining operations," "encourage manufactures," promote the "exploitation of forest wealth, […] construct highways both on land and on water, … and plan markets." In agriculture, he should confiscate lands that are left uncultivated and should "give to cultivators only such farms and concessions as will replenish the treasury and avoid denuding it" (Kautilya 1962, 75). Some passages are concerned with productivity. In mineral extraction, the ruler is advised that the best mines are those that "can be exploited with least expenditure of resources, yielding valuable products and commanding easy communications" (Kautilya 1962, 130). Other passages offer a guide as to which activities bring prosperity to the exchequer and which represent a drain. The former category includes "reward for enterprise, suppression of crimes, economy in administration, prosperity of harvest, growth of trade, conquest of adversity and crisis, reduction of tax-remissions, inflow of precious metals." The latter includes defalcation and individual trading with state funds, "investment" and "extravagance" (Kautilya 1962, 86).

One should think twice before taking the *Arthashastra* at face value. It is not always easy to ascertain which passages are descriptive and which are normative or strategic. Some were added by later authors, and translations from the Sanskrit may have introduced a modern

gloss. Is it nonetheless a ground-breaking text? Certainly, its recommendation of the single-minded pursuit of 'artha' broke dramatically with traditional Brahminic codes (Habib and Jha 2004, 46, 156). But it is not an exemplar of the growth paradigm. That investment is categorized as a drain on the exchequer, next to the misappropriation of funds, is perhaps a hint of this, and so too is Kautilya's suspicion of merchants and his vehement opposition to permitting prices to rise and fall in line with supply and demand (Boesche 2002, 99). These are not in themselves necessarily antithetical to the growth paradigm but they are symptomatic of a fundamental point: the acquisitive projects that *Arthashastra* describes belong strictly to the royal household (not to 'the economy' in general), and its purpose is specific: to ensure the royal treasury is full to the brim. Neither did *Arthashastra* advocate a theory of progress, or anything remotely resembling one. Instead, Kautilya's theory of history is cyclical. Kingdoms come and kingdoms go; they undulate continuously and ceaselessly through three phases – decline, stability, advance – and so on *ad infinitum* (Boesche 2002).

Following the passing of its most celebrated leader, Ashoka, the Mauryan Empire entered terminal decline. Ashoka had elevated Buddhism to a state religion and sponsored its missionary outreach. In China under the Tang dynasty (seventh to ninth centuries AD), Buddhist monasteries established themselves as dynamic centers of economic activity. A striking instance was the Buddhist 'Three Levels' movement. Its monasteries presided over a remarkable process of accumulation, in so-called 'Inexhaustible Storehouses.' Their 'inexhaustible' wealth, the sinologist Jacques Gernet explains (1995, 169), referred to that portion of the monastery's assets that was dedicated to the provision of credit at interest. The historical records tell of astonishing scenes, as devotees vied over who could donate the most to the Inexhaustible Storehouses. From across the empire they streamed to the central headquarters in Chang'an (Xi'an) – then the biggest city in the world – at the gates of which they would deposit cartloads of silks and silver (Hubbard 2001, 154, 198). The fortune was disbursed in the form of alms, harvest loans, and investment in the monastery's religious infrastructure and commercial enterprises.

Buddhist communities, with the Three Levels sect to the fore, "introduced a form of modern capitalism into China," Gernet argues (1995, 228), with "consecrated property, constituted by an accumulation of offerings and commercial revenues." Graeber (2011, 264-8) makes a similar claim, linking it directly to the growth paradigm. The Inexhaustible Storehouses, he

argues, manifested "the quintessential capitalist imperative of continual growth; the Treasuries had to expand, since according to Mahayana doctrine, genuine liberation would not be possible until the whole world embraced the Dharma." This was "something very much like capitalism," in that it embodied "the need for constant expansion. Everything – even charity – was an opportunity to proselytize; the Dharma had to grow, ultimately, to encompass everyone and everything, in order to effect the salvation of all living beings." But how comparable to the capitalist growth imperative is the commitment, however fervent, to the growth of dharma? It is worth recalling that the bulk of the wealth contained in the Inexhaustible Storehouses consisted of offerings of the faithful (Gernet 1995, 211). Their gifts were a monetary form of confession: giving absolved the karmic debts one incurs in this life and in previous lives (Hubbard 2001). The term *inexhaustible*, writes Gernet (1995, 214), "far from signifying an endless accumulation of interests, refers to the psychological mechanism that motivates the gifts. A gift invites a gift in return, and giving is contagious." This was the secret of the sect's success. Charitable disbursements "constituted a form of investment that was highly advantageous" because they elicited "new offerings in turn" (Gernet 1995, 217). Quite unlike a capitalist economy geared to infinite accumulation and the imperative of continuous growth, this was an economy of gift-giving based on the principle of tithing (Hubbard 2001, 153). (Tithes are used by churches for the pursuit of religious goals, including self-preservation and propagation.) Thus, the function of the Inexhaustible Storehouses was to gather together small donations into a common treasury, the better to redistribute the goods received by channeling them into charitable works, liturgical services and above all the infrastructure of religious establishments themselves: stupas, temples and sanctuaries, the casting of bells and statues, and so on (Gernet 1995, 214). Whereas the modern growth paradigm holds that accumulation proceeds 'inexhaustibly' on the basis of continuous increases in productive capacity and corresponding increases in consumption, the inexhaustibility of the Storehouses consisted in something else: first and foremost in their ability to persuade followers to part with goods, and secondarily in revenues from interest payments. It was, Gernet concedes (1995, 93), concerned more with returns on loans, and with acquisitions, "than with production." Its purpose was not the "accumulation of goods" but principally "their redistribution and circulation." It sought to expand not profits but expenditure—expenditure geared above all to ensuring the continuity and prosperity of the Storehouses and the sect itself (Gernet 1995, 217).

The economic efflorescence of Tang China resumed under the Song. The Song dynasty's celebrated culture of invention and innovation contributed to surges in productivity growth in agriculture and manufacturing. This same period, from the seventh to the thirteenth century, also saw significant economic growth in the Arab and Islamic world. Not unlike China, the Abbasid caliphate unified a vast sweep of relatively rich territories, from Persia to the Maghreb (Harris 2003, 28). The caliphates of the southern Mediterranean presided over intensive commercial and martial activity, with organized slave raiding deep into sub-Saharan Africa, luxury trade routes stretching eastward to China and Japan, and a sophisticated financial sector. A succession of dynastic regimes in the Maghreb – the Fatimids and Almoravids, the Almohad caliphate and the Marinids – gained economic and cultural dynamism from their crossroads location: between mountain tribes and lowland towns, between Andalusia and the Atlas, the Sahara and the sea. It was into this world that a pioneer of economic growth theory, Ibn Khaldun (1332-1406), was born.

Ibn Khaldun's *Muqaddimah,* his *Prolegomena* to the history of the world, includes a sophisticated analysis of growth dynamics. Prosperity, he argues (1950, 84), rests on "the intensity of human efforts and the search for gain," as well as an increase in population, which affords greater scope for cooperative labour and specialization. Rising prosperity generates a virtuous circle, based upon private and public consumption creating a stimulus that feeds into the wider economy through multiplier effects. The development of new wants leads to "the creation of new industries and services," and the rising level of demand and incomes contributes to "a rise in the income and expenditure of the whole community" (Ibn Khaldun 1950, 93-95). Together, these stimuli give rise to further increases in prosperity and economic activity, in a self-reinforcing process.

In his theorization of growth, Ibn Khaldun forms an exception to the thought of his age, but it is one that proves the rule. For one thing, his ideas on growth did not become hegemonic. For another, they were embedded in a cyclical theory of development, in which population and commercial expansion synergize with benevolent rule and minimal taxation to yield an upward curve, following which, "at the end of two generations, the dynasty approaches the limit of its natural life. At that time, civilization has reached the limit of its abundance and growth" (Ibn Khaldun 1950, 33). With prosperity comes a demanding citizenry, and luxury, which saps the martial spirit. Together, these put upward pressure on taxation, which

suppresses trade. As living standards rise and former fighters "begin to enjoy more than the bare necessities, the effect will be to breed in them a desire for repose and tranquility" (Ibn Khaldun 1950, 87, 117-118). Ibn Khaldun's thesis on growth is equally a thesis on decline, and is nested within a historical-sociological account of the movement from agriculture to industry, which, in turn, rests upon a Platonic philosophy of civilizational rise and fall. As an analysis of growth dynamics it is strikingly sophisticated for its times, but nowhere does it exhibit the sense of linear historical progression that was essential to the growth paradigm as it gained shape in the following centuries.

Clockwork rhythms

In sifting the ingredients from which the growth paradigm came to be constituted, one could do worse than begin with the transformation in the social construction of time and space. The middle of the second millennium witnessed a tendential shift from 'enchanted' time and territory ~~tended~~ to measurable, linear, gridded conceptions. A potent early lever of the transformation of time was the invention (by a Buddhist monk in Tang China) and diffusion (in fourteenth-century urban Europe) of the mechanical clock. To Europeans of the early modern period the presence and sophistication of church and town clocks came to symbolize the level of a country's mechanical capacity and material well-being (Heller 1996). Striking equal hours, they facilitated the measurement and quantification of time, and its re-conception in linear and abstract terms. In the words of Lewis Mumford (in Gimpel 1976, 169), mechanical clocks "brought a new regularity into the life of the workman and the merchant. The bells of the clock tower almost defined urban existence. Time-keeping passed into time-saving and time-accounting and time-rationing." When one thinks of time, he continues (in Mathai 2013, 23), "not as a sequence of experiences, but as a collection of hours, minutes and seconds," it can be added, rationed and accounted, enabling it to assume the character "of an enclosed space: it could be divided, it could be filled up, it could even be expanded by the invention of labor-saving instruments." Time slipped, so to speak, from the numinous to the numerical.

As with time, so with space. In the sixteenth to eighteenth centuries the development of the sciences of geometry and cartography, which were experiencing a renaissance courtesy of the European 'voyages of discovery' and associated colonial ventures, encouraged the tendency

to see territory as emptiable and fillable, and space as abstract, infinite, and apprehendable in the form of quantitative data. Roman law had conjured the possibility of absolute property and thus the imposition of hard spatial demarcations, a grammar of territoriality that was radically deepened and universalized by the revolutions of commerce and capital (Sack 1986, 63). With land defined as an alienable and commodity-like substance, a revised conception of nature, as existing principally to serve the purposes of landowners and as ontologically external to human beings, lay at hand. Landed property became fully exchangeable with, and even substitutable for, money. In seventeenth-century England, observes Moses Finley (1953, 268), when Lord Nottingham "ruled that 'The principal right of the mortgagee is to the money, and his right to the land is only as security for the money,'" the idea of collateral came to prominence. "Implicit in that transformation was a conception of property whereby everything is readily translated into money." This paralleled a re-evaluation of productivity, summarized by Jason Moore (2014, 204) as a shift from a characteristically feudal orientation to the productivity of land to an emphasis on labor productivity.

The more that economic life came to be geared to value expansion, the more its processes and elements (living standards, for instance) became subject to a regime of quantification. Of course, in previous civilizations, labor, society and nature had been subordinated in certain respects to the calculations and quantitative measures of the ruling institutions, but none exhibited this to anything like the degree found in capitalist society. Modern accounting – the measurement of business activity utilizing double-entry book-keeping in a codified and systematic form – gave greater definition to the abstraction of profit and therewith the concept of capital, and at the same time, in its separation of enterprise and capitalist, contributed to the rationalization and depersonalization of business activity (Nussbaum 2002, 160). Accounting formed a vital element in the process of apprehending labour as a commodity. It formed part of the mechanism whereby, as Catchpowle, Cooper and Wright put it (2004, 1041-1042),

> the various heterogenous forms of human labour are turned into quanta of value; in which concrete labour is dominated by 'abstract labour' in Marx's terms, and in which the production of various useful things to satisfy various specific human needs is dominated not by the satisfaction of those needs but becomes a means to the pursuit of the accumulation of capital.

When land, labour-power and raw materials are, as a rule, subject to sale and purchase, the same authors continue, "the subjection of the labour process to complete calculability" becomes possible, and competition enforces the subordination of "all aspects of the labour process to calculation, with the aim of profit, of capital accumulation." Accountancy, in short, pervades the capitalist realm, for it is in accounting that

> the penetration of the calculating, quantifying intrusions of those intent on extracting a surplus, reaches its fullest extent. It seeps, through the process of ever deepening commodification, into the heart of social life; insidiously, not without irrepressible opposition, but profoundly and systematically.

In similar idiom, Moore (2014, 204) has described the sixteenth-century construction of regimes of abstract social labor and what he terms "abstract social nature" (a set of spatio-temporal processes that simplify, standardize, and map the world "in service to the quantitative expansion of abstract labor"). The regimes of abstract social labour and abstract social nature nourished and were sustained by the scientific revolution, by advances in cartography and "processes of standardization, quantification [and] mathematicization," in the absence of which, value simply could not exist (2014, 200). Capitalism, he concludes (2014, 235), was remaking reality "in its own image and according to its own rhythms."

The conceptualization of time as an abstract, infinite continuum was a prerequisite for the supplanting of pre-existing conceptions of economic affairs by a new imaginary of economic life, as existing in a state of "continuous growth and cultivation" (Düppe, 2011, 88-89). The systematic measurement of abstract objectified time, moreover, was a necessary (albeit not sufficient) factor enabling the emergence of economic growth as a systemic social goal—for growth can only be rigorously expressed as units of value. "Only if output can be unambiguously ranked along the ordinal value index can there seriously be said to be more of anything," Philip Mirowski (1985, 93) points out. Thus, in the England of 1600 the growth paradigm could hardly have existed, for, as Paul Slack observes (2015, 2), no one knew the nation's territory, population or income. But by 1700,

> all these had been calculated within acceptable margins of error and were widely known; they could be related to one another, so that average incomes per head and the distribution of population and taxable wealth could be determined; and they could be

> compared with data from other countries and from the past, where they were available. New information enabled England's improvement, its material progress, to be measured.

The generalization of value relations and monetary calculation, with correlative codes of abstract space and time and of quantification, measurement and standardization, exerted a profound impact within mid-second millennium West European thought upon the conceptualization of rational behavior and helps to explain its tendencies to scientific thinking, abstraction and self-reflexivity (Sack 1986). In the early-modern period some of the ideological clothing of these transformations was provided by Protestantism; in particular Puritanism, with its moral imperatives of dutiful labour and accumulation and its miserly calendar. As early as 1597, the Puritan English clergyman William Perkins (in Münch 1993, 55) bracketed Catholics together with rogues, beggars and vagabonds on the grounds that they added fifty-two saints' days to the fifty-two Sabbaths appointed to God and thereby condemned the flock to spend over a quarter of the year "in rest and idleness." Puritan time was mechanical and constant and relentlessly reified. Time is currency, wrote the Presbyterian preacher Richard Baxter in *A Christian Directory*, with an audience of merchants and agrarian improvers in his mind's eye, "so use every minute of it as a most precious thing, and spend it wholly in the way of duty." Remember, he admonished (in Thompson 1967, 87), "how gainful the Redeeming of Time is […] in Merchandize, or any trading; in husbandry or any gaining course, we use to say of a man that hath grown rich by it, that he hath made use of his Time." "Time is money," chimed Ben Franklin, setting the seal on the transition from the old perception of time as a divine offering to the new view: time set to the metronome of capital investment.

The diffusion of the mechanical clock, the conception of abstract time and space, and modern science marched in lockstep. Carolyn Merchant (1980, 42, 288) contrasts Western Europe in 1500—its economic life largely subsistence oriented, and governed by seasonal cycles; the cosmos imagined organically, as geocentric, finite and cyclical; bodies assumed not to move "unless activated, either by an inherent organic mover or a 'contrary to nature' superimposed 'force'"—with the same region two centuries later when those realities and their accompanying conceptions had been turned upside down. The economies of the Netherlands and Britain were pulsing to the accumulation of capital; Copernicus and Galileo had shown

the universe to be heliocentric and potentially infinite; Galileo and Newton had revealed nature to be a law-governed mechanism, with bodies assumed to move like clockwork: uniformly unless hindered.

Gardening Eden, planting Empire

In the Middle Ages, ideas of social and scientific progress, a culture of agricultural improvement, and the spirit of inventiveness, of knowledge seeking, and a searching, empiricist approach to knowledge acquisition, were not unknown. In Renaissance Europe, interest in social change, in skeptical systematic inquiry and humanistic values blossomed. Nonetheless, ideas of scientific progress, and especially of *social* progress, remained weakly developed until the sixteenth and seventeenth centuries. That juncture witnessed a growing confidence in the propensity of human thought to progressively develop its understanding of the cosmos. In England, Francis Bacon championed materialism and experimental science, together with the notion that knowledge advances progressively. His writings are noteworthy for their use of the term 'growth' equally in relation to flora and knowledge. In the Netherlands, René Descartes presented the accumulation of knowledge as the logical result of the application of rational thought (Friedman 2006, 25). By the time of Bacon and Descartes, beliefs in the progressiveness of science and the propensity of the stock of knowledge to continually grow were beginning to become commonsensical.

The context within which this occurred was formed by the Europe's maritime-colonial expansion, the rise of capitalism, and the scientific revolution. At a general level, the voyages in space accelerated the sense that the times were changing. As described in *History of the East and West Indies* by Diderot and his fellow *philosophes*, the first major history of the European assault on the world:

> There has never been any event which has had more impact on the human race in general and for Europeans in particular as that of the discovery of the new world, and the passage to the Indies around the Cape of Good Hope. It was then that a commercial revolution began, a revolution in the balance of power, and in the customs, the industries and the government of every nation. It was through this event that men in the most distant lands were linked by new relationships and new needs. The produce of equatorial regions was consumed in polar climes. The

> industrial products of the north were transported to the south; the textiles of the Orient became the luxuries of Westerners; and everywhere men mutually exchanged their opinions, their laws, their customs, their illnesses and their medicines, their virtues and their vices. Everything changed, *and will go on changing* (in Outram 1995, 57, emphasis added).

The question of what to make of the peoples encountered in the New World, and what implications followed from their property arrangements, stimulated a new conceptualization of the human story as a history of social progress. From the vantage point of the colonialists, if 'they' were at the primitive stage, had 'we' once occupied it too? If so, how did 'we' get from there to here? In the imagination of philosophers such as Thomas Hobbes and John Locke, imbued with a capitalist attitude to 'improvement' and an imperialist attitude to other peoples, 'America' figured as postlapsarian Nature, its 'savage' inhabitants exhibiting the rudimentary form taken by human society within a state of nature. With the original stage of humanity envisioned as primitive and contemptible, the conceptual environment was created for the liberal-imperialist 'four stages' model of progress to emerge, one that fused formal universalism with the assumption of European command and control. It is no accident that the European voyages of discovery were hailed by Bernard de Fontenelle (in 1686) as the proof of Europe's technical genius. Fontenelle has been hailed as the first to have decisively broken with the idea of historical development as cyclical and to have posited instead the doctrine that human knowledge and wisdom progresses historically, as if by natural law, in an ongoing and unlimited way, evidenced by events documented in the past and observable in the present (Nisbet 2009). His *The Origin of Fables* limned the rudiments of a stadial progress theory. In the first ages of the world, human beings must have been plunged in the same depths of ignorance and barbarism as "the Kaffirs, the Lapps, or the Iroquois today," but just as, say, the Greeks had evolved into rational beings, so too, given time and tutelage, will the Native Americans (Meek 1976, 27).

Colonization of the New World not only spurred European philosophers to elaborate a racialized Progress narrative, it also unleashed material dynamics. The flow of silver plundered from the Americas provided the specie for Europe's trade with the East, helping Dutch and English colonial corporations to monopoly positions in the trade with India. In the West, the American colonies enabled European capital to benefit from an "extraordinary

ecological bounty," and their plantation slave complexes were used as laboratories of capitalist experimentation (Pomeranz 1997, 113; Anievas and Nisancioglu 2013). Slave labour was the foundation of the Atlantic colonial trade, providing England's economy with an injection of demand that was at times indispensable—for instance after 1650 when intra-European commerce was in the doldrums (Anievas and Nisancioglu 2015, chapter 5). As Marx put it (in Miéville 2006, 199),

> the great revolutions that took place in trade in the sixteenth and seventeen centuries, along with the geographical discoveries of that epoch, and which rapidly advanced the development of commercial capital, were a major moment in promoting the transition from the feudal to the capitalist mode of production. The sudden expansion of the world-market, the multiplication of commodities in circulation, the competition among the European nations for the seizure of Asiatic products and American treasures, the colonial system, all made a fundamental contribution towards shattering the feudal barriers to production.

As feudal relations began to buckle in England and the Netherlands, peasants increasingly produced for the market. A prolonged process of rural social differentiation saw the emergence of the triadic class structure of landlord, tenant farmer (yeoman) and laborer. Direct control of agricultural production was increasingly in the hands of yeomen whose engagement in competitive struggle to produce for the market encouraged them to specialize and invest profits in new leases and productivity improvement (Wood 1984). In France too, capitalist forces were making themselves felt already by the sixteenth century: the Wars of Religion expedited processes of primitive accumulation, with poorer peasants uprooted from the land, resulting in large-scale proletarianization and the revaluation of land as capital (Heller 1996).

Where capitalist relations took root, a heightened consciousness of material progress and the language of 'improvement' could be discerned. Across northwestern Europe ancient texts on husbandry were rediscovered and new scientific works were published—an outpouring of 'how to' manuals by (often Puritan) agronomical reformers. In mid-sixteenth century France, "writers were stressing the virtues of diligence and industry which enabled agriculture to flourish and the need to encourage commerce, provided it did not lead to an outflow of

treasure" (Slack 2015, 2). In Elizabethan and Cromwellian England the language of improvement gained ubiquity, and the deployment of new methods of production and the availability of new products made the connections between the advancement of science and changes in everyday life plain to see. It was here, and now, that the idea of improvement – applied to a bundle of processes, including land enclosures, technological inventions and innovations, and rises in living standards – first "became a fundamental part of the national culture" (Slack 2015, 1). Manuals for agricultural improvement multiplied: between 1600 and 1660 their rate of output doubled, a rate of increase rivalled only by publications on mathematics (McNally 1988, 39). The dates are significant. For it was in in bourgeois-revolutionary times that the most bourgeois-evolutionary of injunctions, that to improve the condition of the nation requires gradual and piecemeal change based on material wealth and the well-being that it engenders, first flowered. What one historian calls the "revolutionary moment" of improvement was England in the 1640s and 1650s, "when 'inventions and improvements' became a catchphrase summarizing what useful knowledge and economic advance could be expected to achieve" (Slack 2015, 7). An emblematic example was the publication of *The English Improver,* written in 1649 by Walter Blith, a Parliamentary soldier, and its later edition, *The English Improver Improved.* It promised its dedicatee, Oliver Cromwell, that by means of enclosure and technical progress all lands can be improved: some by two or three times, others by as much as five or six, "and many under a Tennfould, yea Some under a Twentyfould Improvement." The title page of the 1652 edition graphically illustrates the nexus of improvement, imperialism and science. It depicts the swords of the New Model Army being turned into the ploughshares of Providential abundance, and the English Republican turned into the surveyor and improver of the world. Science, alloyed to private property and Puritan diligence, would make the Earth abundant once more (Drayton 2000, 52).

In multiple ways, colonial and capitalist improvement was bound up with transformations in science and technology. Agrarian improvement was fueled by scientific discoveries. These, in turn, were stimulated by the navigational and martial demands of explorers, freebooters and conquerors. European settlers in the New World not only exterminated and subjugated 'new' peoples but turned to objectifying and cataloguing them, drawing comparisons with their own kind and 'improving' them. Early in the process, some English settlers were hesitant to take pride in technological advantage, seeing in it a form of idolatry, but this quickly changed.

Colonists came to emphasize the differences between their culture and customs, in particular their cultivation of abstract sciences such as chemistry, and those of indigenous peoples. The latter were apprehended as objects of improvement, a paternal intervention that would, it was assumed, redound to their good as well as that of the colonizers. Thus, by the middle of the seventeenth century, "the English had constructed an image of the Indian that fits the modern stereotype: the native as pre-scientific and technologically deficient" (Chaplin 2001, 38, 322). Defining their American exploits as 'improvement,' English settlers were linking their colonial handiwork to the same process in the mother country.

The sharpest minds of the seventeenth century were alive to the connections between overseas exploration, the accumulation of knowledge, the invention of technology, and the promise of a new Eden—the myth of a paradise that, interweaving European, Arabic and Indian philosophical traditions with the Middle Eastern idea of the botanical garden, had become central to Christian eschatology. Again, Bacon is the exemplar. According to Christopher Hill (1972, 164),

> he shared the hope of alchemists and magical writers, that the abundance of Eden might be recreated on earth, in Bacon's case by experiment, mechanical skill, and intense cooperative effort. Sin for him was largely the product of ignorance and poverty. Labour, the curse of fallen man, might be the means whereby he would rise again.

Before the English revolution of the 1640s, Bacon was virtually unknown, but in its aftermath his popularity soared in intellectual circles. With only slight hyperbole he has been described as "the most important philosophical and scientific authority of the Puritan Revolution," and Baconianism as "the official philosophy of the Revolution" (McNally 1988, 36). His ideas informed a new image of human progress, one which, although divinely ordained, nevertheless "operates within the world of natural forces, *including human agency*" (Friedman 2006, 34).

Bacon felt that the voyages of 'discovery' were opening up new possibilities, and a new agenda, for natural philosophy. Certainly, his *New Organon* (2000 [1620]), a paean to what he called "the growth of science" (and elsewhere in the same pamphlet the "growth of the

sciences," the "growth of natural philosophy," etc.) posited a causal relationship between the discovery of new territories and the progressive accumulation of knowledge. Knowledge, being spread far and wide, should be "sought out and gathered in (as if by agents and merchants) from all sides" (Bacon, in Langman 2011, 63). Once gathered, scientific procedure requires data to be "numbered, weighed, measured and defined" (Bacon, in McNally 1988, 37-38). In *New Atlantis,* he presented this epistemology—knowledge conceived as a colossal sum of items of natural-historical information, to be collected by 'agents' and accumulated at metropolitan hubs—in the form of literary utopia. The novel follows a group of voyaging Europeans who chance upon a technologically superior culture, Bensalem. The Bensalemian mission is to accumulate natural-scientific knowledge in order to improve human livelihood—or, as one Bensalemite informs the European tyros, to acquire "knowledge of causes, and secret motions of things; and the enlarging of the bounds of human empire, to the effecting of all things possible" (Bacon 1627, 31).

In several respects, Bacon's thinking meshed with emergent bourgeois norms and attitudes. One was his preference for the empirical experience of the scientist and artisan over the dogmatic authority of the priest and university teacher, and, relatedly, his contempt for the economic role of the nobility (McNally 1988, 38). Another was his mechanistic philosophy, on which more below. A third was his vision of conquering nature through empire and *vice versa.* To claim that the idea of dominating nature began with Bacon would be hyperbole. But he and his followers (such as Samuel Hartlib, Robert Boyle, Locke), more overtly than anyone hitherto, injected imperial strains into the ideal of subduing the earth. Colonization, Sarah Irving has shown (2008, 1), was central to their project of restoring "man's empire over nature." They saw the colonies as "a repository of information about the natural world," with America as a potential new Garden of Eden. For them, recovering knowledge of nature was a religious mission. Acting on behalf of God and mankind, English farmers and planters would make the earth fruitful again. (Indeed, 'plantation' evolved in its usage in a way that simultaneously denoted the mastery of nature and of empire. It had previously referred to the 'act of planting,' with 'planting' a synonym of husbandry. In the sixteenth century it came to mean colonial settlement, before migrating to its eighteenth-century meaning: a large estate, typically in regions of colonial settlement, dedicated to the cultivation of cash crops.)

Bacon established a justification for plantations in terms of their 'improving,' 'civilizing' thrust. He cleared a path for the likes of Hartlib, Boyle, Locke and William Petty, all of whom turned the concern to improve domestic 'waste land' in the interest of enhancing agricultural and royal revenue into a justification for settling and improving the colonial 'waste lands.' But they faced a new political context: the English Civil War. It was triggered by events in Ireland – the anti-colonial rebellion of 1641 – and it also ended there, as Cromwell's armies invaded, channeling revolutionary fervor into an exceptionally brutal conquest. Cromwell's colonization of Ireland sealed the success of the English revolution, blocking the path to feudal-absolutist reaction, but in the process it infused England's existing imperial disposition with the republican principles and revolutionary energies of the victorious Puritan party.

Whereas Bacon died before the Commonwealth, Hartlib was closely associated with it, and with Cromwell. He carried forward the Baconian project to record and accumulate natural-scientific knowledge, with its Puritan tendency to focus upon *useful* (and hence *economic*) knowledge. He was an impresario of projects and ideas for social and educational reform, agrarian improvement and colonial plantation. To these ends, he corresponded indefatigably with a roster of largely English and German intellectuals, almost all of whom were Puritan by creed or inclination – including his friends Blith, Boyle, Petty, and Gabriel Plattes. Hartlib's famous 'Circle' of correspondents evolved into the 'Invisible College' and later (*sans* Hartlib) into the Royal Society, England's academy of science. Members of the Circle shared a belief that humankind, in the Fall, had lost agricultural knowledge and technique and that their restoration is a prerequisite for the recreation of our Edenic dominion over nature.

As the Hartlib project of reestablishing Eden advanced, two of its march routes are relevant to my argument. One led from improvement via plenitude to free trade, the other to empire. The first of these begins with idea that the universe is essentially fecund and cornucopian. It was common to a number of philosophers discussed in this chapter (Descartes, for example) but was held especially fervently by members of the Hartlib Circle, notably Plattes and Boyle. They were emphatic that cornucopia had to be unlocked by industry. (In their argot: Eden requires Adam.) In 1639, Plattes published *A Discovery of Infinite Treasure* which aimed to prove that the earth is "capable of producing an infinite amount of agricultural goods if husbandry were properly improved" (Finkelstein 2000, 213). The case rested upon the beliefs

that improvements in agricultural technique are key to ending "povertie and beggerie," and that the soil can be endlessly regenerated thanks to the infinite and inexhaustible supply of fertilizing substances such as "limestone and chalke" (Plattes 1974). Deploying the metaphor of the hive – as Bacon had before him – Plattes argued that people, like bees, should work diligently and for the good of society, and that when as a result their population increases, "so by their industry their food may increase, even as twenty Hives of Bees being all industrious do live as well, as if there were but one in the same garden." For Boyle, similarly, the Earth is a storehouse stocked for the benefit of man. Nature's "grand business," he wrote (in Wood 1984, 58), is to constitute and manage man's "Productions, as to furnish him with Necessaries, Accommodations, and Pleasures," but man has to play his part in the grand cornucopian scheme, and to this end God has furnished him with "a multiplicity of desires" in order that he be industrious enough to complete the conquest of nature (in the sense of knowing it as well as profiting from it).

Cornucopian thinking of the Plattes-Boyle variety provided inspiration to proto-liberal economists, too. Nicholas Barbon, for example, is noteworthy for his theorization of the infinite potential of supply and social demand. The wealth of a country, he maintained, is "perpetual, and never to be consumed" (cited in Finkelstein 2000, 212). For the "Beasts of the Earth, Fowls of the Air, and Fishes of the Sea, Naturally Increase: There is Every Year a New Spring and Autumn, which produceth a New Stock of Plants and Fruits. And the Minerals of the Earth are Unexhaustable." Labour, Barbon was asserting, can create infinite wealth from the limited but renewable – and in this sense infinite – resources of the earth. Given the infinitude of supply, trade is vital in order to carry away the surplus production, and if it does not, the "Labour and Industry of the People" will grind to a halt – for trade is "like the blood through the heart, which by its motion giveth life and growth to the rest of the Body" (in Finkelstein 2000, 207). In this way, Barbon's cosmology of plenitude underwrote a precociously liberal theory of free trade – the links between an embryonic growth paradigm and market paradigm were coming into view.

The Eden Project's other route was toward empire. According to Irving (2008, 49-52), Hartlib *et al.* "brought together the idea of Adam's dominion over nature with colonization." Having earlier focused on a utopian drive for social reform, the quest to improve nature now sallied forth under the flag of empire and state-building. It was hitched to the colonial project,

with scientific advance pursued under Anglo-Protestant colors, and the goals of knowledge accumulation linked to those of imperial expansion. No one was clearer about the program than Boyle. A leading colonialist of the day, his family had been awarded vast tracts of expropriated Irish lands, the revenues from which helped to establish the Royal Society (Linebaugh and Rediker 2012, 123), and it was he who "first put forward a programmatic suggestion for the way in which man's dominion over nature could be restored by fostering a relationship between naturalists and the English colonies" (Irving 2008, 21). In his prospectus, England would function as the world's Bensalem, accumulating natural data drawn from its colonies and applying it to technological development. Nature *was* America. The Earth and the colonies were storehouses for the benefit of England and Europe, with improvement and science pointing the way to prosperity and colonial expansion. But how did these ingredients combine together to bring forth the growth paradigm? In this, I suggest in the next section, the theses and contradictions of scientific economics played a crucial role.

Homo economicus imperiali

As discussed in the previous section, agrarian-capitalist 'improvement' and its theologically intoxicated transplantation to colonial locations generated new data and new demands for detailed knowledge. (How profitable is this tract of land? How can it be made more profitable?) It was a mission that demanded a new type of natural philosophy, one that could appear to be "exact, quantifiable and objective" (Irving 2008, 66). Just such a philosophy was coming into being in the seventeenth century, thanks to the likes of Bacon, Hobbes, Galileo, Newton, Boyle and Descartes. Unlike an ontology—prevalent for example during the Renaissance—that postulates the world as a living macrocosm pervaded by active forces, these thinkers modeled the world as a mechanism: an ordered system composed of modular components connected in a causal nexus in which motion, originally supplied by God, is transmitted in regular temporal sequences from part to part, and as such is accessible to deductive reasoning and mathematical computation (Merchant 1980; Leiss 1994).

The recourse, by Bacon and company, to mechanistic metaphors in their explanations of society and nature arguably relates to their social environment, as an age of manufacture, captivated by the mechanisms of clocks and other devices, met with a new economic system based on abstract labour and exchange-value, with money rendering individual acts

commensurable and homogenous and with the rational calculation of profit and loss occupying increased prominence. With reference to these developments, Franz Borkenau (1971) speculates, the new vision was of the human being as a mechanically functioning creature, a cog in the machine. And if Bacon *et al.* were preoccupied with laws of motion, this, plausibly, related to their location in a world of increasing motion (and commotion), of flux and transition, of discovery, exploration and revolution, and of the supplanting of land by mobile wealth (capital) as the dominant form of wealth for the first time in history. Surely, too, the commercial and accounting revolutions played a part. After all, as Mirowski observes (1989, 119), "the major innovations in the theory of motion follow the changing center of gravity of the major trading axis of early modern Europe, stretching from northern Italy through the low countries and terminating in southeastern Britain" – and this is the same vector along which modern accounting techniques diffused.

The rise of accounting and the scientific revolution stimulated the application of mathematics to human behavior. If this was not altogether novel, it did assume a qualitatively new dimension in the seventeenth century. Baruch Spinoza, Gottfried Leibnitz, Descartes, Newton, Hobbes and others, "began to build a universal quantitative science, *Pantometrika* or *Mathesis universae*, with its branches of *Psychometrika, Ethicometrika*, and *Sociometrika* designed for investigating psychosocial phenomena along the lines of geometry and physical mechanics" (Sorokin 1956, 103). In England the high priests of the cult of measurement and quantification congregated at the Royal Society, where they presided over the first great age of positivist natural *and social* science. As if by osmosis, motifs, metaphors and theories from the natural sciences percolated into the imaginations of economists. For example, Hobbes drew attention to the parallels between the circulation of blood in the human body and that of money within the body politic (Caffentzis 2003, 206). Increasingly, the modeling of nature as a law-governed mechanism such that bodies tend to move like clockwork, as pioneered by Newton and others in the seventeenth century, influenced the conception of 'the economy' as a law-governed mechanism that appeared later in the same century in the work of economic thinkers such as Barbon and Dudley North.

Advances in mathematics and celestial mechanics nourished the hope, most obvious in the work of Hobbes, that human action, just like falling bodies and planetary orbits, may be determined by uniform laws of motion (Hirschman 1997, 13). Hobbes, who was amanuensis

to Bacon during his last five years, sought to apply Baconian scientific rules to the 'science' of the social. He construed the mind as a special kind of machine, with the faculty of reason seen as "nothing but 'reckoning,' that is adding and subtracting, of the consequences of general names agreed upon for the 'marking' and 'signifying' of our thoughts" (Merchant 1980). In mechanizing the human mind and body he pioneered the utilitarian understanding of behavior, as driven by the desire to achieve pleasure and the need to avert pain. "Life it selfe is but Motion, and can never be without Desire," he proposed, and felicity is the "Continual successe in obtaining those things which a man from time to time desireth, that is to say continuall prospering" (in Feldman 2001, 7). The human core, then, is *homo economicus,* whose orientation to material prosperity is sufficiently uniform and predictable that its behavior can be modeled.

In its essentials, this method was adopted by economists, notably William Petty. He devised the first statistically rigorous accounting of the wealth of a country, with the state conceived as a household, and national income accounting as household bookkeeping (Fioramonti 2013). Petty developed it as an exercise in what Foucault terms 'governmentality' – statistical practices deployed by early modern states to manage populations – but with a colonial-ideological twist: to produce a cadastral survey of Ireland that would assess its economic potential for purposes of plunder (including by Petty himself) and 'improvement,' in a manner that could be presented as scientific—through quantification and the reduction of goods to numbers—and hence as 'objective.' For Petty, the imperative to render economic affairs scientific requires the reduction of all economically relevant phenomena to 'number, weight and measure.' The phrase crops up repeatedly – a mantra – in his writings, but his interest in numbers was only secondarily as a statistician. More important was their political and ideological function: numbers enabled the claim of scientific authority to be made, and in this respect the vital element was not their precision or accuracy but the "formal procedure" through which they are produced. It was this, Till Düppe has argued (2011, 118), that enabled Petty to claim objectivity "not in the sense of referring to the existence of particulars, but in the sense of appearing to work beyond his own interest in claiming something particular." The moral stance of disinterestedness was flourishing in a society that was busy re-imagining itself as a congeries of competing interests that lacked an institution capable of negotiating them. It was part and parcel of the new perception of the economy as an institution designed to negotiate interests, and therewith of a discipline, economics, that presents itself as unbiased

and scientific. In short, Petty made a seminal contribution both to the arts of economic administration (statistics) and to the conceptualization of 'the economy' as a distinct field subject to scientific study and accurate measurement. He secured a place for quantification at the heart of the emergent discipline of scientific economics, customized to the purposes of English empire and deployed ideologically, in particular by making the most of the sheen of objectivity with which economic statistics ('political arithmetic,' in Petty's lexicon) comes coated. The policy consequence was that legislators should not seek to overturn natural law ('market forces,' in today's lexicon). "Nature must and will have its course," Petty intoned (in Ullmer 2011); to decree "Civil Positive Laws against the Laws of Nature" would be "vain and fruitless"—not unlike decreeing a law to reverse Jupiter's solar orbit.

In this, Petty exemplified a general phenomenon of seventeenth century English economic thought whereby mercantilists, in teasing out some of the contradictions within their positions, prepared the ground for liberal political economy—with its (to us moderns) recognizable approach to growth. One contradiction was between the mercantilists' export boosterism and a long-established moral economy that sees trade as a hazard to virtue—for it encourages luxury, and, in turn, 'avarice.' But were avarice and luxury evils? Moralists had traditionally regarded them as inevitable but regrettable vices, condemning all consumption as 'luxury' by dint of its tendency to focus attention upon the body and the senses, rather than the soul and the spirit (Cruise 1999). But by the early seventeenth century the thirst for money on the part of monarchs, gentry and burghers was becoming a secular religion, luxury was gaining legitimacy, and pamphleteers identified "private gain" as the compass by which "men generally saile" (Appleby 1978). The end of the century saw post-mercantilist economists develop prototypes of the doctrines that trade and accumulation follow natural laws and that legislative obstacles should not be placed in the path of commerce. This cultural transformation received its blessing from religious institutions. Puritanism, in particular, issued its convoluted stamp of approval for material success and 'improvement,' legitimizing the drive to accumulate wealth – previously regarded as the prerogative of monarchs, monks and merchants – for the multitude.

A second contradiction concerned the understanding of trade as a zero-sum game. Mercantilists viewed *international* trade in these terms, but they simultaneously held the expectation that *within* a nation the growth of commerce yields all-round beneficial effects.

When trade flourishes, wrote Edward Misselden, "the income to the crown is augmented, lands and rents are improved, navigation increases and the poor people find work. If trade declines, all these decline with it" (in Rubin 1973~~3~~9, 37). "Trade if it be well managed," wrote Edward Coke in 1670 (in Cruise 1999, 76), adumbrating a demand-side theory of growth, "no where thrives better than where men spend above the ordinary means of living." Josiah Child (in Viner 1948) declared that "it is evident that this Kingdom is wonderfully fitted by the bounty of God Almighty for *a great progression in wealth and power*; and that the only means to arrive at both, or either of them, is to improve and advance trade." Child also used the term 'growth' not only in its traditional sense, to denote that which 'grows' in a country, its natural produce, but also to refer to abstract phenomena: the "growth of population," the "growth and increase" of the plantations in Virginia and Barbados, and the "growth of trade," referring to general indicators such as numbers of individuals in a colony, the volume of goods produced and shipped and the frequency of journeys undertaken (Child 1751, ix, 139). In this respect he is at the hinge, at which the connotations of 'growth' in economic literature shift from natural and concrete to general and abstract. The modern form of the growth paradigm was edging into view.

A third contradiction in mercantilist thought pertained to questions of free trade. This might sound puzzling. Was not mercantilism a dirigiste dragon that laid waste to polite civilization before Adam Smith arrived to slay it? And yet one finds, at least among post-Restoration mercantilists, unambiguous statements in favor of *laissez faire*, exemplified by Charles Davenant's contention (in Hont 2005 216) that nations that "thrive by Traffick" are those which have "few Laws relating to Trade." Child (1751, 10-11) believed that the laws of money, with their "foundation in nature," ensure a downward trend to interest rates and a correlative upward trend to economic growth—in which respect he quotes Petty: "nature must and will have its course." That mercantilist economists such as Petty, Child, Locke, North and Barbon were early champions of the 'automatic' operation of the price mechanism and free trade is not only counter-intuitive but paradoxical. They all were penning theses on the 'natural laws' of trade with one hand while, with the other, they made their fortunes from palm-greasing, bribery, slavery, imperial conquest and war, and the establishment and administration of chartered monopoly-colonial corporations.

The moral authorization of the profit motive as an economic incentive, and the theorization of *laissez faire*, the laws of free trade, and the conceptualization of equilibrium advanced by Child, Locke and especially North and Barbon in England, and Pierre le Pesant (alias Boisguilbert) in France, combined to move economic theory out of the mercantilist framework and onto liberal terrain. The vindication of the profit motive suggested an identity between private economic and social interests, such that the economic acts of individuals promote prosperity and general welfare (Tieben 2012, 101). In this way, and in contrast to traditional autocratic justifications of social order and even to Hobbes' positing of the necessity of an absolute sovereign, North, Barbon *et al.* laid the foundations of a new model of social order. It arises unintentionally and automatically from the aggregate actions of myriad individuals seeking to improve their lives, actions that manifest as the forces of supply and demand. These, in turn, ensure that the tendency of some to gain at the expense of others is checked not by absolute rule but by market competition. If earlier political-economic thought had construed its subject as an extension of the royal household, this new model posited an interconnected market field that functioned essentially outside the state. In turn, the idea of the economy as a self-regulating mechanism shone a new light upon the question of what arrangements would make for sustained economic growth. This new way of seeing moved to center stage in the age of Adam Smith and the industrial revolution—an era that witnessed a lurch forward in the evolution of the growth paradigm but which lies outside the scope of this chapter.

Conclusion

If economic growth, envisaged as the increase in year-on-year per-capita output, has since the eighteenth century been sustained and rapid, before then it was punctuated~~l~~, modest, or absent. The growth paradigm was largely absent too, as argued in the first section above. Before the eighteenth century little sense existed of 'the economy' as a discrete sphere of social life, still less one that could be measured such that its growth could be estimated. Nor was there a perceived compulsion to growth, nor an ideology of secular, linear progress. The story of the modern growth paradigm is too lengthy and complex to be treated in full in this chapter. (I sketch some aspects in Dale 2012 and 2015). What I have developed instead is a thesis on the social and ideational context in which the growth paradigm was born. I argue that northwestern Europe in the seventeenth-century – a century of explosive bourgeois ambition, creativity and cruelty – marked a watershed. Before, capitalist social relations,

behavior and morality had established themselves, even in England, only sporadically. After, they rapidly gained sway. Before, mathematics and the methods of natural philosophy were the preserve of monks, magi and mavericks. After, they provided the key to understanding the cosmos as well as practical problems of everyday life, not only for philosophers and scientists but for wide sections of society, from improving farmers to enlightened monarchs, from merchants to economists. Natural philosophy – 'science' – came to be identified with control of the natural world and with the associated payoffs for citizens' welfare and military might; and when 'economics' began to precipitate out of natural philosophy its form and purpose were similar. The cosmos, and by analogy the market economy, came to be envisaged as a rule-governed realm, the divinely-authored natural laws of which could be understood – and put to good use ('improvement') – by rational men.

In tandem with these developments arose a new doctrine of historical change. Cyclical concepts remained influential but a unilinear alternative came to prevail. The early narratives of progress focused on the accumulation of knowledge, in some cases infused with a millenarian faith in divine providence. Over time, the narrative secularized, and its scope broadened out from the cumulative progress of scientific knowledge and the general fate of humanity to include human conduct in all its major dimensions: morality and the institutions of government and economy (Wagner 2016). Irrigated by maritime expansion and colonialism, by the scientific revolution and its commitment to cumulatively expand humanity's knowledge of the natural world, by the spirit of rational calculation and quantification and by the conviction that technological arts and scientific knowledge can be applied to the steady improvement of the material conditions of existence, the doctrine of progress flourished during the Enlightenment. By the early eighteenth century, the idea that a nation, or even humanity as a whole, has developed from primitive beginnings and would continue to grow in cultivation and sophistication was widely held. In some accounts, such as Vico's, the doctrine incorporated cyclical elements. In others, notably that of Britain's Whigs, progress was envisaged as uniform and unilinear. Adam Smith and his ilk were convinced that 'material progress' was central to civilizational development, that reaching the 'commercial stage' of economic life was essential, and that, once achieved, further growth was desirable. In rural areas the idea of 'improvement' gained ground, while in the towns, the values of the 'new men' – the merchants and manufacturers, mine owners and bankers, and the technicians, doctors and clerks – underpinned the idea of progress (Pollard 1968, 17). All,

whether improving farmers or urban merchants, inhabited a society that exhibited an increasingly chrematistical pulse – one that contrasted starkly with the pre-capitalist world. In contrast to the political economy of antiquity (think for example of Aristotle's view on chrematistics as a threat to the polis, an essentially cancerous process of the self-reproduction of useless, even dangerous, cells within the body politic), for political economy of seventeenth century England and France, from North, Barbon and Boisguilbert onward, the chrematistical pulse represented an opportunity, even a necessity: the principle of circulation through the arteries and veins of the body economic, pumped by the insatiability of the human appetite for material improvement. Even now, the doctrine of Progress was not automatically linked to the advocacy of year-on-year economic growth. That connection would crystalize later. But the foundations of the modern growth paradigm had been laid.

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[2] According to Thapar, the *Arthasastra* was written by Kautilya but was edited in later centuries. According to Habib and Jha, most of it was written between BC 500-200. Thapar, Romila (1997) *Aśoka and the Decline of the Mauryas*, revised edition, Oxford University Press, Appendix 1; Habib, Irfan and Vivekanand Jha (2004) *Mauryan India*, Tulika Books.