From the post-industrial prophecy to the de-industrial nightmare: Stagnation, the manufacturing fetish and the limits of capitalist wealth

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Abstract
The post-2008 era saw a return of the manufacturing fetish, the idea that manufacturing constitutes the flywheel of growth without which no nation can thrive. Across the Global North and South, voices are calling to reverse deindustrialization and revive manufacturing. While today deindustrialization is met with anxiety, in the 1930s economists predicted deindustrialization but interpreted it as a liberating process leading to a post-industrial age based on material abundance and widespread economic security. Far from delivering this vision, deindustrialization actually produces a precarious economic order driven by labour precarity, economic stagnation and lost development opportunities for the Global South. What can be termed the Baumolian and Kaldorian frameworks, attribute this precarious reality to services’ inability to replace manufacturing as a growth engine given their technologically stagnant nature. However, this article argues that, by focusing on the technical aspects of service economies, such views overlook the social limits of the capitalist economy and its historically specific conception of wealth, value. As capitalism matures, productivity becomes an increasingly inadequate form of augmenting social wealth as it results in great increases in physical output but counterintuitively undermines the expansion of value. Capitalism is underpinned by a secular movement towards declining dynamism, as it increasingly struggles to maintain its former economic vigour. Stagnation and heightened labour precarity are not merely the product of tertiarization but symptoms of capitalism’s declining trajectory.

Keywords
Deindustrialization, capitalism, secular stagnation, Marx, value, Baumol

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Introduction

This article contributes to ongoing discussions on the waning dynamism of global capitalism (Benanav, 2020; Brenner, 2006; Smith, 2020; Streeck, 2016). Since the 1970s, the global economy has seen falling investment rates, a slowdown in productivity and wage stagnation, a trend that was accentuated following the 2008 crisis (Schwartz, 2021; Storm, 2017). Even the Chinese economy’s growth rates were steadily decelerating for a decade before the COVID-19 crisis (Rosen, 2021). The notion of ‘secular stagnation’, which suggests the global economy suffers from a sustained slowdown in growth due to the private sector’s inability to channel existing savings into productive investment, has increasingly crept into the language of worried economists (Krugman, 2013; Summers, 2014). Returning to Marx, this paper argues that the waning vitality of contemporary capitalism can be theoretically grounded in the limits inherent in the capitalist form of wealth, namely value. Despite its historically unique capacity to generate continuous productivity gains, capitalist development is underpinned by a secular movement towards declining dynamism, as the amount of goods and services it can produce grows exponentially but in contrast the expansion of value tends to plateau. According to this article, economic stagnation and heightening labour precarity reflect the increasing inadequacy of productivity growth as a form of increasing social wealth. In making this claim, it critically engages with arguments that attribute capitalism’s underperformance to its sectoral re-composition characterized by manufacturing’s relative decline and the service sector’s rise.

Post-2008, the alleged excesses of the financial sector and the real economy’s stagnation, led to a manufacturing renaissance. Academic and policy-making circles found a renewed interest in the growth-inducing properties of the manufacturing sector, its capacity to remedy chronic stagnation, generate good-paying jobs and provide development opportunities for the Global South (Cohen and Buigues, 2014; National Economic Council, 2016; Naudé and Szirmai, 2012; World Economic Forum (WEF), 2012). Governments around the world have been lured by the idea of reducing their dependence on ‘ethereal financial services’ and instead ‘return to the solid industrial foundations of decades gone past’ (Financial Times, 2018). Despite decades of ongoing deindustrialization, resurrecting a strong manufacturing sector through re-industrialization is back on the agenda of states across the Global South and North. Developing countries that have not yet fully industrialized strive to develop competitive manufacturing capacities, while advanced economies that have haemorrhaged industrial jobs since the 1960s are battling to re-shore manufacturing plants and recuperate the market shares lost to global competition (Pike, 2020). The world is increasingly allured by the manufacturing fetish, the idea that manufacturing can and should take back its role as the flywheel of growth.

The current obsession over manufacturing seems at odds with the so-called post-industrial prophecy (Kumar, 1978). In the 1930s and 1940s, economists such as Clark, Fourastié and Fisher, viewed the diminishing share of manufacturing in the domestic economy as a desirable and inevitable trajectory of modern societies since economic prosperity was tightly linked with the growth of the service sector. The prophecy contended that as productivity and incomes grew, industrial labour would become redundant with people working instead in services, for which there would be growing demand. In the process, the shift to a post-industrial society would guarantee material abundance, leisure and liberate people from strenuous industrial jobs. Rather than a source of anxiety, the post-industrial prophets saw in deindustrialization a sign of progress and successful economic development.
Since then, the prophecy has partially been fulfilled as advanced economies’ shift to services has been accompanied by manufacturing’s growing productive power allowing it to produce more with a fraction of the workforce needed during the prophets’ time (Vollrath, 2020).

Nevertheless, rather than confirming the optimism of the post-industrials, modern economies’ shift to services ultimately created a more precarious economic order characterized by increasingly polarized labour markets, widening inequalities and economic stagnation (Benanav, 2020; O’Donovan, 2020). Why has deindustrialization failed to lead us into the utopia of the post-industrial prophets, ushering us instead into a world of greater economic insecurity with dysfunctional labour markets and secular stagnation as its hallmark traits? Within the political economy and economics literature on deindustrialization and serviceization one can discern two broad frameworks – inspired by the works of Kaldor and Baumol, respectively – identifying the limits of service-based economies. In the Kaldorian framework, manufacturing is a unique and irreplaceable activity that constitutes an economy’s engine of growth. Baumolians on the other hand highlight the laggard and technologically stagnant nature of services. Combined, they suggest that tertiarized economies are bound to be relatively anaemic given the productivity differentials between services and manufacturing.

However, I argue that by focusing on the technical composition and physical properties of different sectors, the Baumolian and Kaldorian lenses miss a more fundamental social tension underpinning the production of wealth under capitalism whereby technical progress fails to sustainably ensure generalized economic prosperity despite its unique capacity to constantly raise the levels of material output. To shed light on this contradictory reality, this article draws from the value-form reading of Marx’s work and its analysis of the form and limits of capitalist wealth (Bonefeld, 2014; Postone, 1993). According to this reading, value is a historically peculiar form of social wealth which is constituted by the average labour time expended for the production of different goods. Value stands in opposition to material wealth which instead comprises the range of goods and services that satisfy human needs. Building on this fundamental distinction, this article argues that the more the capitalist economy matures the more it struggles to generate past levels of prosperity despite achieving continual and historically unprecedented improvements in productivity. Runaway productivity growth creates a growing disjuncture between material wealth and value, as increases in the material output are not translated into equivalent increases in social wealth (Postone, 2017). To secure their share of social wealth, market agents are constantly compelled to employ productivity-boosting technologies and stay in line with prevailing social productivity standards. Yet this process secularly weakens economic dynamism as it increasingly narrows the scope for augmenting the economic surplus that breathes life into the capitalist economy. Capitalist development is self-undermining. It is uniquely dynamic when it comes to raising the volume of material wealth but as a result tends to stagnate in value-terms.

As such according to this article, the limits of post-industrial capitalism can be located on a deeper level than the economy’s sectoral composition. Capitalist competition propels significant technical advancements to overcome various natural or human barriers to productivity growth in different sectors including agriculture, manufacturing and services. At the same time, this dynamic of runaway productivity growth secularly undermines the capacity of any sector to act as a lever of economic growth. This article suggests that stagnation and the precarious labour markets of the post-industrial economy are symptoms of a more fundamental tendency that exhausts productivity’s capacity to increase social wealth.
The paradox of the post-industrial society is that while the contemporary economy could resemble the utopia of leisure and abundance described by its prophets, it ultimately does not despite the growth of society’s productive capacities. The post-industrial prophecy raises the crucial question of what constitutes wealth. Given the historically enormous productivity levels achieved today, the stagnant growth rates of contemporary service-based economies should not necessarily translate into growing economic insecurity. In fact, as John Stuart Mill (2001: 882) argues in his discussion of the stationary state – a situation of economic stagnation driven by the exhaustion of the market’s growth potential – economic deceleration can instead lead to a social order driven by a logic of ‘human improvement’, whereby progress in morals, culture and ‘the Art of Living’ take precedence over the ceaseless expansion of economic output. The reasons why the slowing dynamism of the service economy has instead translated into higher levels of economic insecurity must be grasped through an analysis of the social form of wealth characterizing the capitalist economy.

The next section presents the chief tenets of the post-industrial prophecy, while the subsequent section titled ‘Growth engines and productivity laggards’ discusses the Kaldorian and Baumolian arguments and their limitations. The section on ‘Capitalist wealth and its limits’ advances a value-form approach to understanding the nature of capitalist wealth and its secular tendencies. Finally, ‘Beyond the manufacturing fetish’ examines the historical evolution of different sectors and argues that while the growth of different activities’ productive potential is contingent upon the progress of science and technology, their decline is the necessary outcome of too much productivity.

The post-industrial prophecy

Despite the context of depression and war that characterized the 1930s and 1940s, for some economists the prevailing tensions were temporary bumps on the path to a higher order society: the post-industrial society. In this vision, economic progress would lead to greater prosperity and services would replace industry as the dominant productive activity.

As early as 1933, Keynes (1933: 183) observed that the growth of national wealth is associated with a diminishing role of primary and manufacturing activities and a growing role for ‘houses, personal services and local amenities’. More systematically, Fisher (1933, 1935) argued that technical progress in goods-producing sectors allowed the expansion of service sector, or tertiary, activities in economic life. For Chase (1934), technological change would lead to an ‘economy of abundance’ driving people away from strenuous industrial jobs and into services. Later, another economist, Clark (1940: 176) described this transition as ‘the most important concomitant of economic progress’. In France, Sauvy (1944) and Fourastié (1949) corroborated these views with the latter famously proclaiming ‘the great hope of the twentieth century’ to be humanity’s transition from an industrial to a tertiary civilization.

The post-industrial prophecy was grounded in an evolutionist conception of economic history divided in three phases. First to appear in this narrative are traditional, agricultural societies where the scope for productivity and output growth is limited by weak technical knowledge. Once scientific progress takes off, society enters the industrial age. People develop new production methods that satisfy their basic alimentary needs with relatively little effort and shift the bulk of their labour towards the production of more sophisticated manufactured goods (Fisher, 1933: 380; 1935: 9; Fourastié, 1949: 88–90). Finally, the growth of manufacturing’s productive power paves the way for a final transition towards the tertiary age where the emergence of new needs propels a shift of productive resources
from industry to the service sector (Fourastié, 1949). For the post-industrial prophecy, society’s trajectory follows a linear path towards greater levels of prosperity.

Both demand- and supply-side factors account for this gradual progression of societies to their tertiary stage. As incomes rise, demand for manufactures eventually saturates and people spend a higher fraction of their income on services satisfying ‘higher’ needs such as entertainment, education or health (Fourastié, 1949: 88–92). In addition, productivity growth allows society to spend less time on manufacturing goods and to concentrate its productive efforts on the delivery of those higher end, tertiary products (Fisher, 1933: 380). Industrial labour becomes progressively redundant by the combined effect of demand shifts and productivity growth. Workers are subsequently absorbed by the tertiary sector where productivity is weaker and labour demand is higher.

In a way, the post-industrial prophecy anticipated the deindustrialization that characterized advanced economies since at least the 1960s, when manufacturing began shedding employment shares to the service sector’s benefit (Alderson, 2005). For the post-industrialists however, the tertiary transition is not merely a structural process of economic change, but a civilizational transformation that redefines work, welfare and recreational norms (Fourastié, 1949). Life improves qualitatively as people enjoy a whole range of previously out-of-reach tertiary goods – from education, to health, all the way to travel and entertainment – ‘upon which real civilization depends’ (Fisher, 1935: 9). In addition, the shift from industry to services liberates workers from strenuous proletarian labour on the assembly line and instead work becomes an intellectually enriching activity (Chase, 1934: 287; Fourastié, 1949: 277–280). Moreover, the demise of industrial work opens up the possibility to increase the leisure time available to society’s members (Clark, 1940: 7). Keynes’ (1963) Economic Possibilities for our Grandchildren accurately captures the prophets’ vision. There Keynes projected that productivity would develop to the point that a three-hour working day would suffice to produce the necessities of life, thereby expanding the time available to pursue non-subsistence needs.

Although post-industrialism begun as a marginal discourse in the 1930s, it gained traction among post-war sociologists who further explored its socially transformative implications (Bell, 1973; Drucker, 1969; Riesman, 1958). According to this new generation, the hallmark traits of the emerging service society were the material affluence enabled by technological progress, knowledge’s rise as the most valuable social resource, as well as the obsolescence of market-based mechanisms of allocation typical of industrial capitalism. Although post-industrial society is not always painted in rosy colours, it is nevertheless portrayed as a stage in which economic conflicts between labour and capital over the production and the distribution of the social product retreat along with the industrial society from which they sprung (Bell, 1973: 164; Brick, 1992: 359; Fourastié, 1949: 218). Again, this is echoed in Keynes’ (1963: 366) remarks in Economic Possibilities: ‘the economic problem is not-if we look into the future-the permanent problem of the human race’. According to the post-industrial prophecy, as the factory eclipses from the epicentre of economic life, so too does the class struggle that fractured the industrial world.

In essence, post-industrialism presages a social order where wealth is not measured in the same economistic terms as in industrial society. Characteristically, Fourastié (1949: 269–285) argues that, with the advent of the tertiary stage, society’s focus ceases to be on increasing living standards measured in real incomes, but instead on transforming the mode of living itself through the growing accessibility of immeasurable and welfare-enhancing goods such as education, leisure or fulfilling work. For the post-industrialists,
progress is not measured by the quantitative expansion of economic output but by a notion of improving the quality of life akin to Mill’s stationary state (Gershuny, 1978). According to its forecasters, in the post-industrial world, industrial accounting tools are obsolete as wealth becomes a qualitative measure of human welfare (Bell, 1973: 269–298).

Nevertheless, far from delivering people from economic insecurity, actual post-industrial societies saw the rise of a sluggish economy where stagnant wages and precarious forms of work prevail (Benanav, 2020; Doussard, 2013). As discussed below, some attribute these limits precisely to modern economies’ increased reliance on services.

**Growth engines and productivity laggards**

In line with the post-industrial prophecy, advanced countries’ manufacturing today produces more output with fewer workers than during the prophets’ time. Manufacturing’s share of employment fell at the level of the world economy too, while value added per worker steadily rose (UNIDO, 2018: 29). Yet the post-industrial prophecy was only half fulfilled. Rather than solving the ‘economic problem’, since the 1970s deindustrialization resulted in the destitution of ex-industrial regions, lost development opportunities in the Global South and the proliferation of precarious labour markets. Two set of arguments have been advanced to explain the waning dynamism of service economies, inspired by the works of Kaldor and Baumol, respectively. Kaldorian arguments draw attention to the uniqueness of manufacturing as an engine of growth, while Baumolians depicts the service sector as a productivity laggard. However, as I will argue, their sectoral focus limits their capacity to fully grasp the roots of the unfolding global economic decline.

**The Kaldorian limits**

The Kaldorian limits of service economies refer to the various arguments sharing Kaldor’s insight that manufacturing is special because of its unique growth-inducing properties which set it apart from any other productive activity (Cohen and Buigues, 2014; Hauge and Chang, 2019; Pisano and Shih, 2012). For Kaldor (1967), in agriculture and services productivity growth relies on external technological developments, but in manufacturing it is self-generated. Thanks to increasing returns to scale, manufacturing firms produce more efficiently by simply expanding their output. For Kaldor, not only does manufacturing have inherent growth-inducing properties, but it also constitutes more generally ‘the fundamental “engine of growth”’, as its productivity gains spill over to the rest of the economy raising aggregate productivity and GDP growth (Kaldor, 1996: 40). Agricultural and service-sector production are constrained by natural (e.g. soil fertility) and human (e.g. labour intensity) barriers, respectively, which do not affect manufacturing. Kaldorians highlight that manufacturing is not a mere auxiliary activity that can be disposed of and replaced by services, but instead constitutes the economy’s backbone (McCausland and Theodossiou, 2012).

Since the 1970s, a ‘neo-industrialist’ current emerged that, mirroring Kaldor’s observations, challenged the post-industrial prophecy and questioned the faith put in service-based economies’ capacity to sustain national prosperity (Cohen and Zysman, 1987; Fingleton, 1999; Gershuny, 1978). According to neo-industrialists, the post-industrial society is, simply put, a dangerous myth. Manufacturing is uniquely capable of generating important spillovers to the rest of the economy, stimulating growth in other sectors and driving technological innovation (Cohen and Zysman, 1987; Pisano and Shih, 2012). For instance, the
expansion of many high-value-added tertiary activities ranging from R&D to engineering hinges on a booming manufacturing sector, since they often develop to complement the upstream and downstream side of industrial production (Gershuny, 1978: 113). For neo-industrialists, abandoning efforts to sustain a strong manufacturing base is economically unsustainable, since even crucial tertiary activities are merely intermediate inputs for the manufacturing sector.

Manufacturing is crucial in maintaining high levels of international competitiveness too (Atkinson et al., 2012). Manufacturing goods, which constitute the lion’s share of international commerce, are more tradeable than services and as such countries with stronger manufacturing sectors are better placed to pay for their imports in food, raw materials or energy (Andreoni and Gregory, 2013: 42; Helper et al., 2012). Services are usually less exportable, since many of them, from food to business services, tend to be performed in local markets, whereas all manufactured goods can be packed and shipped across the globe (Bazen and Thirlwall, 1989: 10). By virtue of its high tradability, manufacturing is more exposed to the global market’s competitive pressures, which in turn systematically forces firms to raise productivity.

For Kaldorians, manufacturing’s engine-of-growth function is evident in the missed development opportunities of many developing countries, in Latin America and Africa, that experience premature deindustrialization (Dasgupta and Singh, 2006). In the 1980s and 1990s, many low- and middle-income countries began shedding manufacturing employment shares at earlier per capita levels than high-income countries. Instead of developing large manufacturing bases before deindustrializing like advanced economies, they prematurely shed industrial employment towards low-productivity activities in the primary, service or informal sector (Rodrik, 2015). Failure to develop sizeable manufacturing sectors undermines socioeconomic development as many countries are being deprived of the growth machine that has traditionally permitted countries to reach higher income levels. As opportunities to industrialize become scarcer, many developing countries face bleak prospects for climbing up the value chain ladder, raising wages and even creating jobs (Sumner, 2019).

For Kaldorians, a preponderantly service-based economy is therefore unable to sustain the employment, growth levels and competitiveness of an industry-reliant one.

The Baumolian limits

While Kaldorian arguments highlight the feeble foundations of an industry-less economy by drawing attention to the uniqueness of manufacturing as an engine of growth, the Baumolian lens complements this argumentation by shedding light on the growth-averse nature of the service sector. Such arguments borrow from Baumol’s (1967) model of unbalanced growth which divides the economy into technologically progressive and stagnant activities, broadly represented by manufacturing and services, respectively. The productivity differentials between the two sectors propel a sectoral shift of resources towards less dynamic sectors as high productivity activities require a decreasing amount of labour to meet existing demand. Furthermore, the stagnant sector – in particular personal services (e.g. care, hospitality, foodservices) – is labour absorbing and characterized by weak productivity since there are barriers to raising the output per worker in activities that require interpersonal contact without adversely impacting the quality of the service delivered (Baumol, 1967: 416). Indeed, there are limits to how many haircuts a hairdresser can do in an hour, how many pupils can be taught by a teacher in a day or how fast a surgery can be
performed. By extension, given their interpersonal nature, many services tend to be performed in local markets (Hauge and Chang, 2019: 28; Olney and Pacitti, 2017). Service firms, being relatively sheltered from competition, do not face the same incentives to raise productivity as manufacturing ones. Because of its technical attributes, the non-progressive service sector is structurally bound to continuously see its employment shares grow.

The implications of Baumol’s model are twofold. Firstly, service economies suffer from the cost disease: assuming uniform wages across the economy, each unit of output becomes cheaper as productivity grows in the most progressive sectors, but prices in stagnant service tend to relatively rise since they are unable to allay labour costs through rising productivity. Scholars have drawn on the cost disease to explain the growing polarization of post-industrial labour markets. Given their low productivity, demand for services can only expand if prices are lowered by compressing wages (Emmenger et al., 2012; Esping-Andersen, 1999; Iversen and Wren, 1998). Low wages become the precondition for employment growth in this sector. As manufacturing jobs decline, the share of low-paid, low-skilled service occupations that are difficultly mechanized also expands thereby generating an increasingly ‘inegalitarian wage structure’ (Iversen and Wren, 1998: 512; see Goos and Manning, 2007).

The second implication is the growth disease (Nordhaus, 2008). For Baumol, the growth of stagnant service sectors has a depressing effect on aggregate labour productivity and as such ‘the growth rate of the economy will asymptotically approach zero’ (Baumol, 1967: 419). As manufacturing’s contribution to total output falls, society-wide productivity levels will increasingly reflect those of the service sector and eventually stagnate (Nordhaus, 2008: 18; see Fernandez and Palazuelos, 2012). Put simply, the greater the share of work done in low-productivity activities, the lower the economy’s overall productivity will tend to be. Oulton (2001) argued that, in contrast to personal services, intermediate services, which are consumed as inputs by the manufacturing sector, positively contribute to overall productivity regardless how low their productivity rates actually are. Nevertheless, despite this theoretical possibility, in practice such activities, because of their labour intensity, low tradability and small-scale nature, have experienced stagnant and even negative productivity growth (Hartwig and Krämer, 2019). For Baumolians, the growth disease highlights the technical constraints that prevent a service-dominated economy from emulating the same high growth patterns as industrializing economies.

The Baumolian framework complements Kaldorian arguments by shedding light on the service sector’s aversion to fast-paced productivity growth and its inability to replace industry’s developmental role. Both highlight that there is no contender in sight to substitute manufacturing as the spearhead of economic growth.

**Technology, productivity and growth**

Empirical evidence from across countries confirms manufacturing’s decisive role in generating high growth as well as the negative impact of its dwindling size on aggregate productivity growth (Cantore et al., 2017; Hartwig, 2011; Hartwig and Krämer, 2019; Marconi et al., 2016; Nordhaus, 2008; Szirmai and Verspagen, 2015). However, while there is descriptive validity in their claims, the Kaldorian and Baumolian lenses suffer from a theoretical limitation as they fail to root the structural slowdown accompanying deindustrialization in the broader dynamics of the capitalist economy. Because of their lopsided focus on the
technological structures of sectors, their validity ultimately hinges on the technical feasibility of productivity breakthroughs in services.

While services have been historically recalcitrant to mechanization, they should not be considered as immutably immune to productivity breakthroughs. In response to arguments proclaiming a dearth of innovation in the 1930s, Schumpeter (1994) noted that ‘technological possibilities are an uncharted area’ as we cannot predict the potential of technologies currently laying ‘in the laps of the Gods’ (p. 118). In fact, past decades have witnessed the development of technologies that could potentially overcome some of the Baumolian limits of services by boosting their tradability and productivity. Although manufacturing constitutes the lion’s share of international trade, since 2005 service exports have been growing at a faster rate than goods as digitalization and progress in ICT have improved their tradability (World Trade Organization (WTO), 2019). Activities previously considered immune to competition and traditionally performed locally, such as education, healthcare or business services, can now increasingly be traded on global markets (Stephenson and Sotelo, 2020). Digitalization brings down transaction costs and facilitates the remote delivery of services, increasingly exposing them to the productivity-boosting effects of international trade (Sorbe et al., 2018). Higher education is a case in point as the deployment of digital educational technologies, such as Massive Open Online Courses, has turned educational provision into an exportable good by loosenig geographical constraints (WTO, 2018: 82–83).

Artificial intelligence (AI) is another area of ongoing technological breakthroughs that can spur further service sector productivity. While past automation waves predominantly affected routine manual tasks, AI promises to automate many cognitive tasks that have historically been ‘the exclusive province of humans’ (Makridakis, 2017: 47). Ongoing technological developments allow software and robots endowed with AI to perform not only repetitive tasks but also those requiring higher intelligence, including analytical, intuitive, communicative as well as empathetic skills which are central to most service sector jobs (e.g. robot reporters, chatbots, receptionist robots, AI therapists) (Huang and Rust, 2018). For instance, new robotic technologies render progressively possible the automation of various services in the hospitality and tourism sectors that involve emotional labour and complex social interactions (Ivanov et al., 2017). AI technologies open up the possibility for a service sector industrialization that could break through some of its traditional barriers to productivity growth.

Nevertheless, ongoing breakthroughs in digital and AI technologies cannot guarantee that a transformed, high-tech service sector will sustainably raise aggregate growth levels. In effect, the activities that successfully implement AI might experience a trajectory similar to manufacturing (Sorbe et al., 2018: 29). Over time, labour made redundant by productivity growth in AI-driven services would be eventually absorbed by low-productivity activities in the rest of the service sector. An AI revolution could again subject the economy to Baumol’s diseases inadvertently dragging down aggregate growth rates as the output shares of high-productivity services decline to the benefit of non-automated activities (Aghion et al., 2019). Just as manufacturing productivity growth pushed labour to low productivity services, a high-tech service sector will eventually accelerate this movement towards remaining low productivity activities. As Aghion et al. (2019: 238) put it ‘growth may be constrained not by what we are good at but rather by what is . . . hard to improve’. Paradoxically, in the long run improving the productivity of different activities does not translate into sustained increases in economic growth.
The Baumolian and Kaldorian focus on the technical composition of sectoral activities misses a more fundamental social limit of the capitalist economy whereby productivity growth increases society’s overall material output, but in the long run undermines the system’s economic vitality. Stagnation cannot be fully grasped by one-sidedly focusing on the technological attributes of different activities. Instead, it must be grounded in the social dimension in order to fully understand why capitalism stagnates despite its historically unique capacity of ‘constantly revolutionizing the instruments of production’ (Marx and Engels, 1967: 222). As suggested below, Marx’s approach looks beneath the purely physical characteristics of different economic activities to uncover the social limits intrinsic to the specifically capitalist conception of wealth.

**Capitalist wealth and its limits**

At the heart of the post-industrial society lies a tension between, on one hand, the capacity of industrial productivity to generate increasing levels of material output while potentially liberating people’s time for self-development – as suggested by the post-industrial prophets – and, on the other, actually existing post-industrial capitalism where the growth of productivity has translated into dysfunctional labour markets and economic insecurity. Marx’s distinction between value and material wealth can make sense of this tension. Value is constituted by labour time and is the form of wealth prevailing in capitalism. Material wealth comprises the various things that satisfy the ‘manifold variety of [human] needs’ (Marx, 1973: 527). Crucially for Marx, productivity exclusively refers to the amount of material wealth produced in a given timespan, not value. Building on this distinction, this section argues that the two-sided character of wealth is the source of capitalism’s growing difficulties as productivity raises the amount of goods and services that society can produce, yet wealth in its value-form does not expand at the same pace. Too much productivity generates conditions of declining dynamism as firms need to undertake more and more investments to remain in competition even as the production of surplus value falters. As such the tensions of post-industrial capitalism can be grasped in light of the properties and limits of value, the form of wealth whose motion animates the whole capitalist system.

In contrast to material wealth, value is not a tangible substance but an essentially social category that emerges through the exchange of commodities (Bonefeld, 2010; Clarke, 1991). While all products and services can be qualitatively distinguished by their different shapes, weights and uses, all commodities can nevertheless be reduced to one common element, namely labour time expenditure. The capitalist market abstracts the qualitative properties of products and reduces them to different quantities of time. Effectively ‘time becomes the thing that is exchanged’ (Tomba, 2013: 108). Crucially, the value of different commodities is not determined by the time required to produce them individually, but by the average time required to produce them within the whole market (Marx, 1976: 129). Therefore, all firms contribute to the establishment of society-wide productivity standards in their respective sectors that the market translates into average values and prices. Those with below-average productivity are forced to sell at a loss, while those operating above market standards are handsomely rewarded (McNally, 1993:179). Value, as Postone (1993: 288) puts it, is a ‘temporal form of wealth’ as the fortune and destitution of individual capitals are ultimately determined by their capacity to abide by this socially generated temporal norm. In capitalism, social wealth is realized not by augmenting the physical output, but by selling commodities produced in accordance with prevailing productivity norms.
Value’s dominance as a form of wealth stems from the peculiar character of social relations under capitalism, which are premised upon the separation of the mass of the population from the means of subsistence (Bonefeld, 2014). To access the necessities of life, people must secure a job in the labour market, while firms to remain viable must sell commodities that yield more value than what it costs to produce them. This surplus value consists of the labour-time workers expend beyond necessary labour, the labour time needed to reproduce the value of their labour power (Marx, 1976: 325). Surplus value is generated by a social process operating macroeconomically, as each day workers collectively work for longer than the ‘labour time necessary to [their] existence’ (Marx, 1976: 646). Competition redistributes this mass of surplus labour in the form of profit among competing capitals according to their size and performance relative to productivity standards (Marx, 1981: 299). Society’s total surplus labour time constitutes the fund from which individual capitals draw their profits and secure their share of socially produced wealth.

Capitalists’ struggle to secure a share of this temporal surplus animates the whole economy. In their pursuit of profit, firms collectively generate a tendency to raise general social productivity levels and increase surplus value at the level of the total economy (Marx, 1976: 432). The competitive pressures exercised by firms at the leading edge of the productivity frontier force competitors to adopt new productivity-enhancing methods and conform with the emerging productivity standard. Once the new productivity norm is widely established, the tempo producers must reach to guarantee their commodities bear profitable fruit accelerates as the volume of goods produced per time-unit grows (Postone, 1993: 193). As this process is generalized across the economy, the time needed to produce workers’ ‘subsistence bundle’ (i.e. necessary labour) also falls (Booth, 1991: 14). General productivity growth consequently lengthens the relative span of surplus labour as less and less time is required for workers to produce the commodities needed for their reproduction (Marx, 1976: 432). A quasi-automatic augmentation of the economic surplus emerges from the competitive encounter of firms in the global market whereby with each wave of productivity growth, surplus value occupies a larger fraction of totally produced value.

However, runaway productivity growth is bound by limits built into the capitalist form of wealth (Postone, 2017). While a rise in productivity increases material output, it does not augment the value it represents since the total labour time needed to produce it remains unaltered. Instead, the same value as before is now spread more thinly across a larger number of commodities as the time socially required for their production falls (Marx, 1976: 137). Productivity growth does not alter the total amount of value produced in a given timespan but it compresses the time in which commodities must be produced to realize their full value (Postone, 1993: 289). As such, surplus value can only augment as a share of an overall stagnant magnitude of socially produced value.

Consequently, the larger the fraction of surplus value relative to total value, the harder it becomes to further extend it (Marx, 1973: 338). To the extent that necessary labour time has already been significantly reduced, the amount of time that could be converted into surplus labour gets tendentially smaller. For example, if every generalized productivity wave halved necessary labour, the surplus would expand at slower rates in each wave, as the new increment in surplus labour time would be half the previous one (Marx, 1973: 335). Even as productivity results in constant increases in the material output, the production of surplus value falters and augments at increasingly negligible doses. As such, the higher the productivity historically achieved, the larger the productive effort needed to realize even modest increases in surplus value (Marx, 1973: 340). In a way, the more productive capitalism has
become, the more it struggles to emulate past patterns of economic prosperity. The trajectory of capitalist development resembles an 'asymptotic curve' (Postone, 2016: 504); despite enormous increases in the material output, it constantly nears the limit of zero increases in surplus value without ever reaching it. Material wealth and value move at different cadrances, as output grows in direct proportion to the rise in productivity but the social surplus grows at ever diminishing rates.²

The growing disjuncture between material output and value suggests that economic dynamism tends to wane because of the high productivity levels already achieved. As companies introduce labour-saving technologies to stay in line with social productivity standards, the mass of commodities inundating the market increases but inversely their prices fall in line with the labour time socially necessary for their production. To remain as profitable as before, companies must redouble the sales effort, as falling prices squeeze the profits contained per unit of output. Firms increasingly struggle to pocket the surplus value produced since they must dump more and more commodities on the market just as each wave of productivity growth heightens the risk of production oupiring society’s consuming power (Clarke, 1994: 229). They are compelled to sell more even as the production of surplus value stagnates. The productivity race creates an environment conducive to intensified competition, overcapacities and falling returns that forces firms to elbow each other out to expand their own market shares. As the market glut intensifies, it accelerates the liquidation of backwards units and ‘the concentration of capital in large amounts at a small number of places’ (Marx, 2010: 108). While different sectors become increasingly monopolized by fewer companies, the market’s competitive dynamism sputters out as stagnation secularly takes place (Clarke, 1994: 242). Individual sectors become less attractive for new investment because the opportunities for profitable production are increasingly scarce and fewer newcomers are allowed entry into existing markets. Capitalist firms are locked in a productivity race that progressively paved the way for economic slowdown as they struggle to realize the value of the ever-growing mass of commodities.

In a context of stagnation firms are pressured to devise alternative ways to secure revenue streams. These might involve investing in financial assets or repurchasing their own shares in the stock market in order to raise their prices, capitalizing on intangible assets – such as trademarks and copyrights – to establish monopoly rights over the sale and production of certain goods/services or even engaging in mergers and acquisitions to expand their market reach (Baglioni et al., 2021; Blackburn, 2006). To remain solvent, market agents are increasingly allured by strategies that inadvertently further entrench the unfolding slowdown.

Crucially, the growing disjuncture between material wealth and the labour time it represents explains why people’s economic insecurity grows alongside the exponential growth of capitalism’s productive potential. Higher productivity renders workers in maturing industries increasingly superfluous, as each portion of invested capital sets less labour in motion to produce as many as or more commodities than before (Marx, 1976: 781–782). Capital must grow at accelerating rates just to maintain existing employment levels, yet the stagnation of surplus value production disincentivizes new investments. The redundant workforce becomes instead available to work in labour-intensive industries where mechanization has not progressed yet (Marx, 1981: 344). The same process that increases general social productivity permits the proliferation of a range of labour-intensive and low-productivity industries – from personal services to sweatshops – that can take advantage of the growing demand for jobs and the downwards pressure exerted on wages (Tomba, 2013). Stagnant activities expand in tandem with the maturation of automated industries, since the mass of
workers that are superfluous to the latter constitute a cost-effective investment for the former (Smith, 2020: 132). There is a quasi-automatic rebalancing mechanism that counteracts the exhaustion of productivity growth as a means of increasing surplus value by liberating a workforce readily available for activities where wages tend to be lower and working conditions more intense (Caffentzis, 2013: 272). The expansion of surplus value increasingly comes to rely on wage compression and work intensity as opposed to productivity growth.

Economic stagnation and the dysfunctional labour markets of post-industrial capitalism can be interpreted as concrete symptoms of the underlying limits in expanding wealth in its value-form. Competition compels capitalist producers to constantly boost their productivity in order to secure a share of social wealth. Yet in doing so they inadvertently generate a dynamic that secularly tends to undermine economic dynamism and exacerbate labour precarity.

**Beyond the manufacturing fetish**

The limits of value suggest that capitalism’s tendency towards declining dynamism cannot be fully grasped by a one-sided focus on the technical barriers that services pose to productivity growth. In fact, as this section shows, throughout its history technological innovations consistently allowed capitalist production to overcome natural and physical barriers to productivity both in manufacturing and agriculture. Yet these sectors have struggled to maintain their economic vitality even as their productive potential accelerated.

Manufacturing’s appeal stems from its inclination to mechanization, which allows it to adequately abide by competition’s pressures for increased output per unit time. Marx himself had observed that manufacturing production, unlike primary sectors such as agriculture and mining, is not ‘tied up with natural conditions’ that cripple output growth – such as climate or soil fertility (Marx, 1981: 369). Capitalist production was, unable to subject activities involving ‘organic processes…in the same way as…purely mechanical or inorganic chemical processes’ characteristic of factory production (Marx, 1971: 368). Furthermore, as Keynes (1933: 83) observed ‘most modern processes of mass production can be performed in most countries and climates with almost equal efficiency’. More recently, Rodrik (2013) demonstrated that manufacturing is characterized by ‘unconditional convergence’, whereby, unlike in other sectors, productivity levels across the Global North and South tend to converge regardless of their host countries’ development levels or institutional traits. Manufacturing’s Kaldorian properties derive from its capacity to operate under any conditions, as the factory floor appears insulated from the influence of the natural and interpersonal barriers that limit the productivity of agriculture and services, respectively.

However, a brief overview of manufacturing’s evolution suggests that its high-productivity owes not to its inherent physical properties, but to a gradual transformative process that subjected it to the imperatives of capitalist profitability. In its infancy, factory-based production encountered its own natural barriers to productivity growth. Before the widespread adoption of the steam engine factories in the cotton, paper, all the way to metallurgical sectors, were wholly dependent on human, animal or natural sources of energy (i.e. wind and water), which like agriculture rendered their performance subject to external conditions such as location and weather (Deane, 1979: 137). It is the transition to the coal-fuelled steam engine that liberated manufacturing production from such constraints (Malm, 2016). However, even at the height of the First Industrial Revolution, hand-powered technologies were preferred in certain industries, such as textile and shipbuilding, since
lacking the precision, intuition and expertise of manual workers, energy-powered machines often damaged the final product’s quality (King, 2001: 74–75). Progressively, the adoption of the American system of manufacture in the 19th century – which relied on the production of interchangeable parts rather than skilled handicraft – allowed the combination of highly mechanized production with high-quality products. Similarly, before the Second Industrial Revolution, many manufacturing operations could difficultly take place outside daytime. At last, electrification, by providing constant and steady illumination of the workplace, overcame manufacturing’s dependence on sunlight or fire-prone gas lamps and paved the way for round-the-clock production (Nye, 1992: 193).

On the other hand, early manufacturing also faced subjective barriers such as high labour turnover and the resistance of workers culturally unaccustomed to the intensity of factory work (Pollard, 1963). It took the development of new management methods such as Taylor’s Scientific Management to curb workers’ aversion to the discipline of the clock and adapt the workforce to mechanized production (Kanigel, 1997). In other words, like agriculture and services, manufacturing encountered its own material and human barriers to maximizing output. It is the gradual development of new management tools and scientific discoveries that transformed manufacturing production into a ‘form adequate to capital’ (Marx, 1973: 694).

Similarly, while traditionally considered a laggard sector, since the 1950s agricultural production underwent its own industrialization (Bowler, 1992). The increasing mechanization of farming and livestock production as well as the introduction of agrochemicals together allowed the consolidation of economies of scale in a sector traditionally resistant to it. For instance, glasshouse technologies in horticulture created controlled environments to ensure production regardless of climatological conditions, while increasing pesticide and fertilizer use sought to bypass biological barriers to maximizing crop output (Bowler, 1992: 13). Livestock farming productivity was raised thanks to growth-promoters and antibiotics which were introduced in animals’ feed to shorten their breeding cycle and bring them faster to slaughter weight (Otter, 2015: 224). Global agriculture’s industrialization since the Second World War sought precisely to technologically overcome the ‘organic processes’ which according to Marx handicapped agricultural productivity relative to manufacturing (FitzSimmons, 1986).

Overall, the capitalist economy has undertaken impressive leaps to overcome any barriers to productivity across different activities. However, the social limits of productivity undermine their dynamism in the long run. Agricultural production, according to Cochrane’s (1958) metaphor, runs on a technological ‘treadmill’ whereby producers are forced to continuously increase capital investment in order to remain cost competitive, but only to be ultimately rewarded with diminished returns. While new farming technologies provide temporary gains to those who introduce them first, once universalized they lead to an overproduction of crop which brings down prices and wears away farm profits (Blank, 2008: 144). Agricultural producers are secularly compelled to take on increased debt to finance their investments or increasingly rely on state subsidies simply to remain in competition precisely because productivity has grown to such extent.

Similarly, since the 1970s global manufacturing has ceased functioning as a growth engine (Benanav, 2020). Following almost three decades of high productivity growth, the sector subsequently experienced a global spiral of rising overcapacities, dwindling profitability and drying up investment (Brenner, 2006). As already mentioned, the waning developmental role of industrialization is particularly pronounced in prematurely
deindustrializing economies of the Global South. The massive productivity increases already achieved by the North, as well as late-industrializers such as China, have led to drastic declines in manufacturing prices that ‘discourage[e] newcomers in developing countries from entry’ into global markets (Rodrik, 2015: 8). Developing economies that are able to develop competitive manufacturing activities cannot create enough jobs to significantly raise incomes because of the sector’s high capital intensity (Kunst, 2019). Both the industrialized North and the global South struggle to further expand manufacturing since declining prices stifle profitability and discourage new investment. Continuous productivity growth has progressively rendered manufacturing unable to act as a development lever.

Agriculture’s and manufacturing’s impressive productivity growth tendentially eroded their capacity to act as levers of growth. Service-led growth might be subject to just the same limits. Digital and AI technologies can boost services’ tradability and productivity, but cannot guarantee sustainable contributions in GDP and employment in the long run (Aghion et al., 2019). AI-driven services could join the ranks of manufacturing and agriculture where productivity has grown immensely but their share in national economies has been dwindling to the benefit of low-productivity activities. Instead of mass unemployment, a technological upgrading of services would increase the share of labour-intensive work, as expelled workers migrate en masse to those sectors where automation has not yet progressed to the same extent. Such industries appear as employers of last resort for a workforce made redundant by automated sectors leaving workers little room to refuse such jobs, despite poor remuneration (Smith, 2020).

The principal difficulty for capitalist production is not raising the productivity of different activities but averting their decline as they mature. Technical innovation allows the overcoming of organic, climatic or even anthropogenic obstacles to productivity growth, but in the long run constrains the possibilities for further expansion as existing capacities appear increasingly disproportionate relative to the possibilities for profit.

**Conclusion**

This article sought to discern the social roots of the global economic slowdown by offering a theoretical explanation for why contemporary capitalism intensifies economic precarity, delivers higher levels of economic insecurity and produces stagnation despite its capacity to generate more material output than any social formation in history. In doing so, the article critically engaged with arguments that attribute waning economic dynamism to the changing sectoral composition of modern capitalism. According to the Kaldorian and Baumolian frameworks, the lack of high growth levels and good jobs in post-industrial economies is due to the absence of a solid manufacturing base. They highlight the inability of the service sector to take on the role of growth engine given its inherently technologically stagnant nature. However, by grounding their arguments in the technical composition of sectoral activities, the validity of the Baumolian and Kaldorian arguments hinges on the technical feasibility of productivity breakthroughs in the service sector.

This article provided an alternative account for the decline of deindustrializing economies that locates its roots within the broader social dynamics of the capitalist economy. Building on Marx’s fundamental distinction between material wealth and value, this article suggested that the more capitalism develops its productive potential the less it is able to sustain its former economic vigour. Although capitalism’s historical trajectory is marked by a tendency to continuously break the barriers that inhibit productivity growth, it encounters growing...
difficulties in expanding wealth in its value-form. More specifically, the array of useful
goods and services that the capitalist economy can deliver grows with every increase in
productivity, yet the production of surplus value tends to stagnate.

This growing chasm between material wealth and value tends to strain economic dyna-
mism. Competition compels firms to chase profits by deploying productivity-boosting tech-
nologies that allow them to remain in line with average productivity standards. However, in
doing so they accidentally contribute to the emergence of conditions of economic slowdown.
Their competitive encounter allows the production of ever-growing masses of commodities
whose value they subsequently struggle to realize as runaway productivity growth tests the
limits of the market. The result is a spiral of overcapacities, falling profits and stagnation
that forces firms to adopt defensive strategies to secure their revenues, further cementing the
unfolding economic decline. Productivity’s progressive exhaustion as a means of augment-
ing social wealth is accompanied by the economy’s growing reliance on labour-intensive
activities where the surplus can be increased by other means, such as lower wages or intense
working conditions. Economic deceleration and intensifying precarity are not conditions
caused by the service sector’s growth, but secular tendencies deriving from the social form of
wealth itself.

In an era of global deindustrialization, for some, escaping the stagnation trap entails a
return to solid manufacturing bases. For others, future economic prosperity lies not with
manufacturing but with the high-tech, AI-led service sector. The conclusions of this article
however suggest that the social choice confronting us today is not one between a revitalized
manufacturing sector or a modernized service economy. Rather, Marx and the post-
industrialists invite us to ask: ‘what counts as wealth?’. By switching our attention to the
social form of wealth, it is not clear why we should keep growing at all. The post-industrial
prophecy and Marx’s critique open up the possibilities to envision alternative social orders
where the production of wealth does not demand to constantly labour faster to keep up with
competition. Rather, the immense productivity gains already achieved under industrial cap-
thitalism pave the way for a conception of wealth that is constituted by the time freed to
pursue the sheer variety of human aspirations, pleasures and needs.

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Notes

1. Marx referred to this process as the production of relative surplus value.
2. This analysis is related but not synonymous with the law of the tendency of the rate of profit to fall (TRPF) (see Kliman, 2012; Vidal, 2019). According to it the profit rate declines because as capitalism develops, labour, the only value-producing factor of production, is tendentially displaced by machinery. Firms introducing new technologies experience rising returns, but the economy’s average profit rate falls since labour’s share in total investments declines. The TRPF is a process that is recurrently offset by various countervailing mechanisms such as the cheapening of capital inputs, large-scale bankruptcies or increases in surplus value large enough to compensate for the relative growth of fixed capital (Harvey, 2010: 94). Nevertheless, the faltering production of surplus value that I discuss weakens the profit-raising effect of these counterven- ticles. There is an underlying secular tendency in capitalism towards the increasing disjunction between value and material output and the TRPF is only one of its implications (Clarke, 1994: 208).

References

Aghion P, Jones BF and Jones CI (2019) Artificial intelligence and economic growth. In: Agarwal A, Goldfarb A and Gans J (eds) The Economics of Artificial Intelligence. Chicago: University of Chicago Press, pp.232–287.
Alderson AS (2005) Deindustrialization. In: Beckert J and Zafirovski M (eds) International Encyclopedia of Economic Sociology. London: Routledge, pp.138–140.
Andreoni A and Gregory M (2013) Why and how does manufacturing still matter: Old rationales, new realities. Revue D’économie Industrielle 144: 21–57.
Atkinson RD, Stewart LA, Andes SM, et al. (2012) Worse than the Great Depression. Washington, DC: The Information Technology & Innovation Foundation.
Baglioni E, Campling L and Hanlon G (2021) Beyond rentiership: Standardisation, intangibles and value capture in global production. Environment and Planning A: Economy and Space. DOI: 10.1177/0308518X21997835.
Baumol WJ (1967) Macroeconomics of unbalanced growth: The anatomy of urban crisis. The American Economic Review 57(3): 415–426.
Bazen S and Thirlwall A (1989) Why manufacturing industry matters. Economic Affairs 9(4): 8–10.
Bell D (1973) The Coming of the Post-Industrial Society. New York: Basic Books.
Benanav A (2020) Automation and the Future of Work. London: Verso.
Blackburn R (2006) Finance and the fourth dimension. New Left Review 39: 39–72.
Blank SC (2008) The Economics of American Agriculture. Armonk, NY: M.E. Sharpe.
Bonefeld W (2010) Abstract labour: Against its nature and on its time. Capital & Class 34(2): 257–276.
Bonefeld W (2014) Critical Theory and the Critique of Political Economy. New York: Bloomsbury.
Booth WJ (1991) Economies of time: On the idea of time in Marx’s political economy. Political Theory 19(1): 7–27.
Bowler IR (1992) The Geography of Agriculture in Developed Market Economies. Harlow: Longman Scientific & Technical.
Brenner R (2006) The Economics of Global Turbulence. London: Verso.
Brick H (1992) Optimism of the mind: Imagining Postindustrial Society in the 1960s and 1970s. American Quarterly 44(3): 348–380.
Caffentzis G (2013) In Letter of Blood and Fire. New York: Autonomedia.
Cantore N, Clara M, Lavopa A, et al. (2017) Manufacturing as an engine of growth: Which is the best fuel? *Structural Change and Economic Dynamics* 42: 56–66.

Clark C (1940) *The Conditions of Economic Progress*. London: Macmillan.

Clarke S (1991) *Marx's Theory of Crisis*. New York: St. Martin’s Press.

Cochran W (1958) *Farm Prices: Myth and Reality*. Minneapolis: University of Minnesota Press.

Cohen E and Buigues P (2014) *Le Décrochage Industriel*. Paris: Fayard.

Cohen SS and Zysman J (1987) *Manufacturing Matters*. New York: Basic Books.

Dasgupta S and Singh A (2006) Manufacturing, services and premature de-industrialisation in developing countries: A Kaldorian empirical analysis. Working Paper No. 327, CBR, University of Cambridge.

Deane PM (1979) *The First Industrial Revolution*. Cambridge: Cambridge University Press.

Doussard M (2013) *Degraded Work*. Minneapolis: University of Minnesota Press.

Drucker PF (1969) *The Age of Discontinuity*. London: Heinemann.

Emmenger P, Häusermann S, Palier B, et al. (eds) (2012) *The Age of Dualization*. Oxford: Oxford University Press.

Esping-Andersen G (1999) *Social Foundations of Post-Industrial Economies*. Oxford: Oxford University Press.

Fernandez R and Palazuelos E (2012) European Union economies facing ‘Baumol’s disease’ within the service sector. *Journal of Common Market Studies* 50(2): 231–249.

Fingleton E (1999) *In Praise of Hard Industries*. Boston: Houghton Mifflin.

Fisher AGB (1933) *Capital and the Growth of Knowledge*. *The Economic Journal* 43(171): 379–389.

Fisher AGB (1935) The economic implications of material progress. *International Labour Review* 32(1): 5–18.

FitzSimmons M (1986) The new industrial agriculture: The regional integration of specialty crop production. *Economic Geography* 62(4): 334–353.

Fourastié J (1949) *Le Grand Espoir du XXe Siecle*. Paris: Presses Universitaires de France.

Gershuny J (1978) *After Industrial Society?* London: Palgrave.

Goos M and Manning A (2007) Lousy and lovely jobs: The rising polarization of work in Britain. *The Review of Economics and Statistics* 89(1): 118–133.

Hartwig J (2011) Testing the Baumol–Nordhaus model with EU KLEMS data. *Review of Income and Wealth* 57(3): 471–489.

Hartwig J and Krämer H (2019) The ‘growth disease’ at 50 – Baumol after Oulton. *Structural Change and Economic Dynamics* 51: 463–471.

Harvey D (2010) *The Enigma of Capital and the Crises of Capitalism*. London: Profile Books.

Hauge J and Chang HJ (2019) The role of manufacturing versus services in economic development. In: Bianchi P, Duran CR and Labory S (eds) *Transforming Industrial Policy for the Digital Age*. Cheltenham, UK: Edward Elgar, pp.12–36.

Helper S, Krueger T and Wial H (2012) *Why Does Manufacturing Matter?* Washington, DC: Brookings Institute.

Huang MH and Rust RT (2018) Artificial intelligence in service. *Journal of Service Research*, 21(2): 155–172.

Ivanov SH, Webster C and Berezina K (2017) Adoption of robots and service automation by tourism and hospitality companies. *Revista Turismo & Desenvolvimento* 27(28): 1501–1517.

Iversen T and Wren A (1998) Equality, employment, and budgetary restraint: The trilemma of the service economy. *World Politics* 50(4): 507–546.

Kaldor N (1967) *Strategic Factors in Economic Development*. Ithaca: Cornell University Press.

Kaldor N (1996) *Causes of Growth and Stagnation in the World Economy*. Cambridge: Cambridge University Press.
Kanigel R (1997) *The One Best Way*. New York: Viking.

Keynes JM (1933) National self-sufficiency. *Studies: An Irish Quarterly Review* 22(86): 177–193.

Keynes JM (1963) *Essays in Persuasion*. New York: Norton.

King S (2001) *Making Sense of the Industrial Revolution*. Manchester: Manchester University Press.

Kliman A (2012) *The Failure of Capitalist Production*. London: Pluto Press.

Krugman P (2013) Secular stagnation, coalmines, bubbles, and Larry Summers. *The New York Times*, 16 November. Available at: https://krugman.blogs.nytimes.com/2013/11/16/secular-stagnation-coalmines-bubbles-and-larry-summers/.

Kumar K (1978) *Prophecy and Progress*. Harmondsworth: Penguin Books.

Kunst D (2019) Premature deindustrialization through the lens of occupations: Which jobs, why, and where? Tinbergen Institute Discussion Paper, TI2019-033/V.

Makridakis S (2017) The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms. *Futures* 90: 46–60.

Malm A (2016) *Fossil Capital*. London: Verso.

Marconi N, de Borja Reis CF and de Araújo EC (2016) Manufacturing and economic development: The actuality of Kaldor’s first and second laws. *Structural Change and Economic Dynamics* 37: 75–89.

McCausland WD and Theodossiou I (2012) Is manufacturing still the engine of growth? *Journal of Post Keynesian Economics* 35(1): 79–92.

McNally D (1993) *Against the Market*. London: Verso.

Marx K (1971) *Theories of Surplus-Value, Part III*. Moscow: Progress Publishers.

Marx K (1973) *Grundrisse*. London: Penguin.

Marx K (1976) *Capital, Volume I*. London: Penguin.

Marx K (1981) *Capital, Volume III*. London: Penguin.

Marx K (2010) Economic manuscripts of 1861–1863. In: Marx K and Engels F (eds) *Collected Works*. Volume 33. London: Lawrence and Wishart, pp.9–426.

Marx K and Engels F (1967) *The Communist Manifesto*. London: Penguin.

Mill JS (2001) *The Principles of Political Economy*. Kithener: Batoche Books.

National Economic Council (2016) *Revitalizing American Manufacturing*. Washington: The White House.

Naudé W and Szirmai A (2012) The importance of manufacturing in economic development: Past, present and future perspectives. Working Paper No. 2012-041, UNU-MERIT, Maastricht.

Nordhaus WD (2008) Baumol’s diseases: A macroeconomic perspective. *The B.E. Journal of Macroeconomics* 8(1): 1–39.

Nye D (1992) *Electrifying America*. London: MIT Press.

O’Donovan N (2020) From knowledge economy to automation anxiety: A growth regime in crisis? *New Political Economy* 25(2): 248–266.

Olney ML and Pacitti A (2017) The rise of services, deindustrialization, and the length of economic recovery. *Economic Inquiry* 55(4): 1625–1647.

Otter C (2015) Industrializing diet, industrializing ourselves: technology, food and the body since 1750. In: Helstosky C (ed.) *The Routledge History of Food*. New York: Routledge, pp.220–246.

Pike A (2020) Coping with deindustrialization in the global North and South. *International Journal of Urban Sciences* 1: 1–22. DOI: 10.1080/12265934.2020.1730225.

Pisano GP and Shih WC (2012) *Producing Prosperity*. Boston: Harvard Business Review Press.

Pollard S (1963) Factory discipline in the industrial revolution. *The Economic History Review* 16(2): 254–271.

Postone M (2016) An interview with Moishe Postone. *Crisis and Critique* 3(3): 501–517.

Postone M (2017) The current crisis and the anachronism of value: A Marxian reading. *Continental Thought & Theory* 1(4): 38–54.

Postone M (1993) *Time, Labor and Social Domination*. Cambridge: Cambridge University Press.

Riesman D (1958) *Abundance for What?* New York: Routledge.
Rodrik D (2013) Unconditional convergence in manufacturing. *The Quarterly Journal of Economics* 128(1): 165–204.

Rodrik D (2015) *Work and Human Development in a Deindustrializing World*. United Nations Human Development Report Office. New York: United Nations.

Rosen D (2021) China’s economic reckoning. *Foreign Affairs* 100(4): 20–29.

Sauvy A (1944) Progrès technique et répartition professionnelle de la population. *Population (French Edition)* 4(1): 57–76.

Schumpeter JA (1994) *Capitalism, Socialism & Democracy*. New York: Routledge.

Schwartz HM (2021) Global secular stagnation and the rise of intellectual property monopoly. *Review of International Political Economy* 1–26. DOI: 10.1080/09692290.2021.1918745.

Smith JE (2020) *Smart Machines and Service Work*. London: Reaktion Books.

Sorbe S, Gal P and Millot V (2018) Can productivity still grow in service-based economies? OECD Economics Department Working Papers No. 1531, OECD Publishing, Paris.

Stephenson S and Sotelo J (2020) Trade in digital services is booming. Here’s how we can unleash its full potential. Available at: www.weforum.org/agenda/2020/06/trade-in-digital-services-is-booming-here-s-how-we-can-unleash-its-full-potential/ (accessed 12 December 2020).

Storm S (2017) The new normal: Demand, secular stagnation, and the vanishing middle class. *International Journal of Political Economy* 46(4): 169–210.

Streeck W (2016) *How Will Capitalism End?* London: Verso.

Summers LH (2014) U.S. economic prospects: Secular stagnation, hysteresis, and the zero lower bound. *Business Economics* 49: 65–73.

Sumner A (2019) Global poverty and inequality: Change and continuity in late development. *Development and Change* 50(2): 410–425.

Szirmai A and Verspagen B (2015) Manufacturing and economic growth in developing countries, 1950–2005. *Structural Change and Economic Dynamics* 34: 46–59.

The Economist (2014) Arrested development. *The Economist* 413(8907): 11.

Tomba M (2013) *Marx’s Temporalities*. Leiden: Brill.

UNIDO (2018) *Industrial Development Report*. UNIDO: Vienna.

Vidal M (2019) Geriatric capitalism: Stagnation and crisis in western capitalism. In: Vidal M, Smith T, Rotta T, et al. (eds) *The Oxford Handbook of Karl Marx*. New York: Oxford University Press, pp.581–606.

Volrath D (2020) *Fully Grown*. Chicago: University of Chicago Press.

WEF (2012) *The Future of Manufacturing Opportunities to Drive Economic Growth*. Geneva: World Economic Forum.

WTO (2018) *World Trade Report*. Geneva: World Trade Organization.

WTO (2019) *World Trade Report*. Geneva: World Trade Organization.