I. THEORETICAL ASPECTS

1
Entanglements of Catching-up: Rethinking 'Industrial Revolution' from a Global Perspective*

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Abstract

The main objective of this contribution is delinking the historiography about the Industrial Revolution in Western Europe both from a predominantly internal and a Western/Eurocentric perspective of analysis. This requires questioning long-established narratives, confronting and re-interpreting them in a way that they do not privilege the regions that introduced the factory system first. Methodologically, this is realized by assessing industrial development not from a (western) forerunner's but from a multiple catching-up perspective.

Until today, catching-up attempts, successful or unsuccessful, have been attributed to agrarian, not industrially under or poorly developed regions/countries, striving to achieve industrial development, which were labelled 'progress'. Broadening the notion of catching-up requires including into the comparison the industrialized nations themselves, looking for global preconditions for their modernization.

This approach also allows considering developing nations'/regions' attempts to adapt or copy Western achievements in technology and productivity on the same conceptual premises in later periods. Catching-up is a permanent, continuous process, inter-linking advanced and less-advanced economies in the process of competitive challenge, leading to innovation, on the one hand, and adaptive response, on the other, embedded into spatial and technological re-arrangements. Industrial history thus can be understood as a process of permanent adaptions, allowing previously less competitive actors to advance temporarily, until the advance pushes others towards adaptive measurements in order to close the gap or to restore imbalances at a new level.

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Introduction

The main aim of this article is delinking of the historiography about the Industrial Revolution in Western Europe both from a predominantly internal and a Western/Eurocentric perspective of analysis. This requires questioning long established narratives, confronting and re-interpreting them in a way that they do not privilege the regions that introduced the factory system first.

If we recognize that Western Europe's economic trajectory was a path that was embedded in global exchange, competition, we have to look at the global as well as the regional conditions that allowed Western Europe, later the West, to become the leading industrial region of the world – at least between the 1820s and the 1970s. Western Europe and the western path of industrial development cannot serve any more as a universal model or benchmark. We therefore follow Dipesh Chakrabarty's methodological claim of 'Provincializing Europe' (2008), *i.e.* looking at Europe, or the West, as one of the provinces of the world instead of taking it as uncontested model or core (see Ertl, Komlosy, and Puhle 2014). 'Provincializing Europe' requires:

1) Considering the achievements and contributions from non-European, mainly Asian regions, which until the 18th century set the standards of technology and trade, and attracted Western merchants to import not only spices and dyes but manufactured goods as well. This allows re-assessing the Western 'revolutionary' success story in the light of the preceding competitive advantage of Asian industrial production. First Western merchants' global trade networks were based on re-export. Later on Western manufacturers replaced both Asian manufacturers and European merchants with domestic industry within the framework of the emerging national political economy. Acquiring and transferring processing knowledge (*e.g.,* in applying dye-stuff on cloth) and ousting Asian products from European, Asian domestic and export markets became a precondition for their success. Following this approach, European achievements should be assessed in terms of interactions with and transfers from non-European societies.

2) Considering the global conditions and competitive relations, which encouraged and pushed British (followed by other western nations) producers to pass on from a domestic, craft and putting-out system of manufacture (the so-called manufacture and putting out system) to centralizing production in factories, and from hand-operated devices to water- or steam-powered machines.

3) Manufacturing and putting out systems in export trades developed in many European and Asian regions on local, regional or transregional scales in the 17th and 18th centuries. They introduced profound organizational and technological improvements, which can be labelled 'industrious' (see Vries 2008)

to distinguish them from later developments that came along with centralizing and mechanizing production in factories. Industrious production systems were carried on in Asian regions throughout the 19th century, while England and other Western countries introduced the factory system. Once this transition was made, industrious crafts were denied the right to represent a proper path of industrial development. Industry was reduced to power-driven manufacturing industry.

4) Considering the consequences of introducing the factory system in Western Europe (in other words, achieving and pursuing a series of 'Industrial Revolutions') to those parts of the world, which in the 19th century maintained domestic, labor-intensive craft and putting-out systems of industrial production and passed to the factory system only throughout the 20th century. When and how did Asian producers lose their competitive position? This question takes on new relevance, as South and East Asian countries regained leading economic positions at the turn of the 20th to the 21st century.

This article aims at formulating a research program that would interrelate industrial development and catching-up in different world regions in a longitudinal perspective (from the 1770s to the present). The focus is on South/East Asian and West/Central European manufacturing regions, from the 19th century onwards also including the United States as a major part of the West. Considering other world regions and their entanglements with Asian and European/Western developments are beyond the scope of this article.

Defining Industrial Revolution

The classical definition of 'Industrial Revolution' is inseparably linked to the factory system, first introduced in British cotton mills around 1800. Centralizing production and wage labor in mills, replacing hand devices by power-driven machines were the basic characteristics of the factory system, which became a synonym for 'Industrial Revolution'.[1] Technological innovation, site architecture, workplace and energy transmission, work floor organization, labor recruitment and labor relations were seen as related, indispensable components of the 'Industrial Revolution', which had become the key issue of modernization in historical, technical and social sciences from the 19th century onwards. While most authors concentrated on technology, management and labor organization (see Landes 1969; Paulinyi 1991), others also referred to state and institutions (see Mokyr 2009; Teich and Porter 1996; Vries 2013; Zmolek 2013[2]) in order to enable and promote the 'Industrial Revolution'. It became common sense to see Great Britain as its birthplace, and the specific political and economic conditions at the end of the 18th century as favourable if not decisive for its rise, even if the long-term developments were often considered more important than 'revolutionary' changes (see Braudel 1988; Grinin and Korotayev 2015). Global studies and critics of colonial and imperialist exploitation added

[1] Following the classical definitions of Chris Ashton (1969) and David Landes (1969).

[2] Zmolek emphasized the defeat of direct producers' struggles in Britain as a major precondition for the Industrial Revolution to set off and transform agrarian into industrial capitalism.

new perspectives to the narrative by acknowledging international trade and division of labor as a key factor (see Allen 2009; Frank 1998; Komlosy 2004; Vries 2013; van Zanden 2009). Whether or not and to what extent colonialism, extraction and appropriation of raw materials and unequal exchange had played a decisive role in the transformation of Britain and other Western countries into 'industrial' ones had become important part of the discussion.[3]

The further development of the factory system contributed to acknowledging successive stages of the Industrial Revolution, resulting in first, second, third and fourth numeration, continuing until today. Others define the introduction of the factory system in Britain as the final phase of the Industrial Revolution (1760–1830), building up on an initial phase (in the 16th century), and a middle phase (from the 17th to mid-18th centuries) in various European regions, while the British breakthrough led to an introduction of the factory system into new sectors and regions (Grinin and Korotayev 2015). The geographical spread led to debates about the preconditions and possibilities to initiate, to copy or to take over the model that had lost its British uniqueness and became a universal aim and indicator of modernity and development instead.

There is much literature on the 'Industrial Revolution', so that an overview is not feasible. It is highly controversial and still, in spite of different concepts and narratives, it has common features and definitions, which prevent us from assessing it from a perspective that does not assume that Britain is the birthplace from where it started its victorious globalization.

Table 1. Characteristics of the British 'First Industrial Revolution' (1760–1830) serving as a model for follow-up industrial revolutions

Key components			
Energy	New source (*e.g.*, muscle –> water -> steam)	New form of supply (*e.g.*, canals, railways, pipelines)	New application in production process (*e.g.,* transmissions, motors)
Machinery	Saving labor (*e.g.,* introducing power-driven machines)	Improving the capacities and quality of existing products (*e.g.,* durability of colors)	Enabling new products (*e.g.,* alloys, chemicals, synthetics)
Labor management and increase of productivity	New machinery (*e.g.*, power loom replacing hand loom)	Restructuring of the commodity chain: division of labor within (*e.g.,* Taylorism, Fordism) and beyond the factory (globalization of commodity chains)	New control systems (time management, surveillance, labor codes)

[3] Compare the debate between O'Brian pleading for internal causes and Frank pleading for external causes (O'Brian 1982; Frank 1978).

If we accept the three key characteristics such as coincidence and interrelation of: 1) a new energy system, 2) a new type of machinery, 3) a new type of labor management, one can hardly find a similar innovation before the British one at the turn of the 18th to the 19th century. This is even more the case, if we add institution building, property relations and class arrangements. Within the logic of the definition, the association of 'Industrial Revolution' with the British case, serving as well as a universal model, makes sense. However, challenging inherent Eurocentrism requires questioning this finding.

Why should the British way of modernizing manufacture at a specific moment of history be taken as the one and only way to the modernization of material production, to increasing output and productivity? This position does not primarily concern the effects of industrial change in Britain; it rather reflects the British success in infiltrating the assessment of what 'Industrial Revolution' is standing for: By taking their particular British way of modernization as the general, universal one, the British case has been establishing its characteristics as benchmarks to be followed by all other nations or regions, when they want to enroll in modern economic growth. We must consider the universalizing moment in interpreting progress as part of the discussion of industrial modernization. It is helpful at this point to refer to postcolonial perspectives, taking the Western self-perception of successful industrial transformation as the reverse side of ascribing deficiencies and modernization blockages to Asian actors, framed as processes of orientalization (see below).

One of the ways to search for a more open definition of 'Industrial revolution' would be to open up criteria to call the innovation 'revolutionary'. This could, on the one hand, lead to the inclusion of various innovative moments into the list and putting 'Industrial Revolution' into the plural. One does not have to reach out as far as to the invention of fire making, pottery production, metalworking, or the wheel, just to name some of the early innovations of humankind. Under the Chinese Tang and Song Dynasties (the 7th – the 12th centuries) basic mechanical principles of spinning, weaving, sawing, grinding, pumping, printing, *etc.* were developed for application in mechanical devices for production, qualifying this period as particularly innovative – with a global impact (see Deng 2015). The innovations in discovering dye stuff and applying it to color and ornate fibre, cloth, or paper took a more contingent form, but at a certain moment long-lasting experiments and experience culminated in an outstanding knowledge of West, South and East Asian manufacturers, for example rendering Calico printing a globally acknowledged innovation (Aiolfi 1987; Raj 2006). British inventions in the 18th century were equally based on previous inventions, often disqualified for being pre-industrial or proto-industrial, although they can also be qualified as 'revolutionary'. So, on the other hand, the outstanding 'revolutionary' character could be taken as something that was rather due to its firm assertion than to its effective impact. Should we reserve

the label ‘revolutionary’ for really path-breaking transformations that have brought about substantial changes in the mode of production and its social organization? Which events in humankind do deserve such a label? Or should we instead flatten the term and equally use it for smaller inventions that promoted growth in productivity?

Applying the term ‘industrial revolutions’ to all kinds of innovative situations is not the procedure undertaken in this article. Defining ‘industrial revolution’ by any rise in the effectiveness of energy use, product, process and productivity innovation in material production would lead to an endless list of ‘industrial revolutions’, showing the contribution of almost all world regions and cultures to revolutionary innovation. It would end up in a world history of innovations in industry and agriculture. Against such an encyclopedic procedure the coincidence of energy, machinery and labor organization, as it is represented by the British case, seems to be a reasonable point of reference to classify ‘revolutionary’ industrialization.

The ‘revolutionary’ power-driven factory system based on wage labor began in English, Scottish, Welsh and some continental west European regions. From here it started to put competitive pressure on all other existing systems of organizing manufacture and agriculture. However, as conventional diffusionist wisdom says, it did not simply spread to the rest of the world. It was transforming pre-existing systems of production and subordinating them to unfavorable trade relations and low-end positions in commodity chains, extracting surplus value from local production and hereby subsidizing the advanced industrial cores. It did not allow colonized or otherwise subordinated cultures to maintain their traditional mode of combined agricultural and industrial production in the framework of the household economy any longer, as if nothing had happened (Beckert 2014). Surrendering to the cores and becoming suppliers of raw materials was one of the possible reactions taking over the core-type pattern of modernization. Only rarely regional ways to cope with the challenges were developed. The latter was especially the case in East Asia, where labor-intensive industry survived the challenge of British factory products (Austin and Sugihara 2013; Frank 1998; Hamashita 1994; Sugihara 2005).

So let us return to where we started. Is there really no alternative to the British narrative?

With regard to labor organization, one might discuss whether or not the Caribbean and American plantation system was even more ‘revolutionary’ than the British cotton mills (van der Linden 2008). Plantations uniquely relied on forced labor; under the slavery system the workers were completely uprooted and cut off from any means of subsistence; they were dependent from company provisions, but the low level did not allow a long life, so that slaves had to be replaced by new ones. In this sense, the commodification of labor (materialized in the commodification of the whole person) was much more radical, encom-

passing the enslaved workers in all their facets of life, while in Britain and other Western industrializing countries commodified labor only accounted for a part of the working population and a part of their working time. However, the plantation system did not transform the energy basis and the machinery, and is therefore not qualifying for revolutionary innovation in all three characterizing fields.

Therefore, we accept the narrow definition of 'Industrial Revolution', applicable only to situations in which the three criteria for revolutionary change were met. The concept is strictly shaped by a specific historical experience, embedded into the specific power relations of British hegemony in the 19th century. It spilled over to continental European regions and to North America, but it remained a Western phenomenon. While it may fit for the Western industrializing world, it must not be universalized. Let us see, whether or not and how it might be replaced, if one wants to avoid Eurocentric usurpation.

Catching-up as a Methodological Approach to Industrial Development

Until today, catching-up attempts, successful or unsuccessful, have been attributed to agrarian, industrially under or poorly developed regions/countries, striving to achieve industrial development, labelled 'progress'. I suggest broadening the notion of catching-up by including into the comparison the industrialized nations themselves, looking for global preconditions for their modernization.

In order to avoid the trap of reproducing Euro- or Western-centred narratives, our perspective on industrial advancements will not address industrial achievements or paths of development from a forerunners' perspective, which automatically risks to be associated with Western advancement. Instead it will concentrate on catching-up strategies, assuming that any advancement in technology, management or labor organization is taking place under the conditions of inspiring models and competitive challenges. These external factors create the conditions under which a given society is coping with competitive pressure, giving way to imitation, adaption, integration of external solutions or the independent development of new methods and ways. Assessing innovation in terms of catching-up instead of discovery allows embedding processes of innovation into a network of relations instead of attributing it to outstanding lonesome ingenuity.

One should consider those actors, who had to cope with competitive challenges or pressure by new products, processes or management techniques, undermining their previous economic modes, social relations and political systems and obliging them to acquire new ways to preserve their own socio-economic potential. If they do not adapt to the new techniques and production

systems, they risk being excluded from market access or integrated into commodity chains on a subordinate position. From an empirical point of view, exclusion, peripheralization and subordination were much more frequent outcomes of competitive pressure than successful handling of adaptive reforms (Menzel 2015).

I therefore propose studying the decline and the adaptive responses of former industrial regions, facing competitive, eventually peripheralizing pressure from the new industrializing ones. We are used to associate the Global North with competitive advance, the Global South with imitative or adaptive catching-up; by evaluating catching-up on a broader, less Western-centric basis in a long-term perspective, we realize that leading regions and their producers may lose their competitive advantage, giving way to newly emerging industrial actors and polities.

In Western Europe catching-up discourses have a longer tradition. They date back to the 16th century, when the emerging royal, imperial or princely states engaged in a competitive process of state formation that opened up towards transforming loose, composed, often scattered empires into territorial forms of political economies. One can even speak of nationalizing the old concept of empire – confessionalization – serving as an important means of unification. In this perspective, catching-up discourses can be rooted in the nationalizing movements of German or English Protestantism (Hirschi 2005). In the 17th and 18th centuries mercantilism and cameralism gave way to 'jealousy of trade' debates that preceded later ideas of inter-state competition and policies in support of catching-up of political economies vis-à-vis imperial competitors (Hont 2005). Cameralist and mercantilist programs are excellent sources for assessing catching-up discourses. It would be promising to compare the arguments of the early European inter-imperial catching-up debates with later ones, developed in the core-periphery or North-South conflict. This article only enters the debate, when catching-up was used as an analytical metaphor as well as a strategy with regard to the introduction of the factory system in Western European countries at the turn of the 18th to the 19th century. This was the moment, when centralization and mechanization of manufacturing in factories, first realized in Britain, established new criteria of competivity, progress and modernity, devaluating all other attempts and paths of economic development that did not introduce the factory system.

The catching-up approach also allows considering developing nations'/regions' attempts to adapt or copy Western achievements in technology and productivity in later historical periods on the same conceptual premises, for example after decolonization and political independence. Catching-up is a permanent, continuous process, inter-linking advanced and less-advanced economies in a process of competitive challenge, leading to innovation on the one

hand, and adaptive response on the other, embedded into spatial and technological re-arrangements. Thus, industrial history can be understood as a process of permanent adaptations, allowing previously less competitive actors to advance temporarily, until the advance pushes others towards adaptive measurements in order to close the gap, or to restore imbalances at a new level. This approach is very similar to that of Grinin and Korotayev who introduce the term 'catching-up divergence' for the period from the 16th to the 18th century, when West European nations were able to narrow the gap in innovation, standard of industrial production and living, which separated them from the leading Asian empires. The term refers to the 'Great Divergence' of the 19th century, when the West clearly overtook Asian empires and transformed them into supply and sales markets for Western factory production (Grinin and Korotayev 2015: 41–50). My approach is also based on Andre Gunder Frank's work *ReOrient*, referring to the changing position of East Asian states when closing and reversing the West-East gap to their advantage from the 1980s onwards (Frank 1998) – a trend which Grinin and Korotayev denote as 'Great Convergence'.

Under these conditions it becomes possible to assess the Western industrial nations' leading position as a historical phenomenon: rising against Asian competiveness in the 17th and 18th centuries until achieving global hegemony in the 19th century, facing regional shifts of leadership within the Global North during the 19th and 20th centuries, and falling behind re-rising Asian competitors in the 21st century (*Ibid.*; Grinin and Korotayev 2015; Menzel 2015). All these shifts can be framed with the help of 'catching-up'.

Table 2. World industrial production[4] 1750–1980: Selected states' shares

	1750	**1800**	**1830**	**1860**	**1880**	**1900**	**1913**	**1928**	**1938**	**1953**	**1963**	**1973**	**1980**
Great Britain	1.9	4.3	9.5	19.9	22.9	18.5	13.6	9.9	10.7	8.4	6.4	4.9	4
France	4	4.2	5.2	7.9	7.8	6.8	6.1	6	4.4	3.2	3.8	3.5	3.3
Germany	2.9	3.5	3.5	4.9	8.5	13.2	14.8	11.6	12.7	5.9	6.4	5.9	5.3
Russia/SU	5	5.6	5.6	7	7.6	8.8	8.2	5.3	9	10.7	14.2	14.4	14.8
USA	0.1	0.8	2.4	7.2	14.7	23.6	32	39.2	31.4	44.7	35.1	33	31.5
Japan	3.8	3.5	2.8	2.6	2.4	2.4	2.7	3.3	5.2	2.9	5.1	8.8	9.1
China	32.8	33.3	29.8	19.7	12.5	6.2	3.6	3.4	3.1	2.3	3.5	3.9	5
India	24.5	19.7	17.6	8.6	2.8	1.7	1.4	1.9	2.4	1.7	1.8	2.1	2.3
Brazil				0.4	0.3	0.4	0.5	0.6	0.6	0.6	0.8	1.1	1.4
Mexico				0.4	0.3	0.3	0.3	0.2	0.2	0.3	0.4	0.5	0.6
World total	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Bairoch 1982: 296, 304.

[4] All manufacturing except for mining, construction, water, electricity.

Table 3. The Top Ten Manufacturing Countries in the World in 2016

Rank	Economy	Industrial output (in billion USD)
1	China	4,566
2	European Union	4,184
3	The United States	3,602
4	Japan	1,368
5	Germany	1,050
6	India	672
7	South Korea	531
8	The United Kingdom	505
9	France	47
10	Italy	442

Source: URL: https://www.worldatlas.com/articles/10-countries-with-the-highest-industrial-outputs-in-the-world.html.

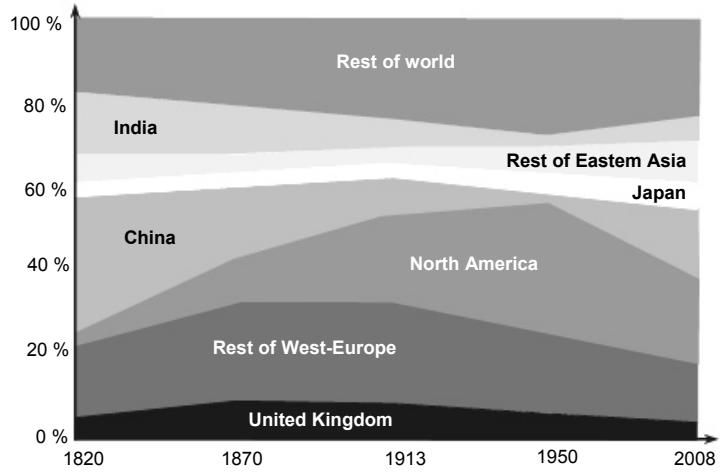

Fig. 1. Regional distribution of global GNP, 1820–2008

Source: Angus Maddison Historical Statistics (URL: htpp://www.ggdc.net/MADDISON/oriindex.htm).

Note: Global GDP share relations show a similar pattern of temporarily rising Western Europe, later followed by the increase of North America, since the 1950s the rest of the world and, most strikingly, China have been increasing their shares.

Backwardness versus Peripheralization

Catching-up should be defined by copying and taking-over (including adaption) of more advanced techniques and proceedings in production, trade, finance, infrastructure and political institutions by a supposedly less developed

region/polity, in order to achieve the standards of the supposedly more developed one (Komlosy 2012). The comparison of development usually refers to states, statehood allowing political activity to support economic improvements; achieving statehood is therefore viewed as a precondition to implement catching-up development. However, not only states but also regional and local governments and institutions can promote catching-up. And transfers and imitations can have various aims, fields and directions. So catching-up at first glance seems to be a more neutral term than industrial development, or 'Industrial Revolution', allowing including manifold active and reactive measurements to defend or to achieve a better socio-economic performance at a regional or state level. Catching-up does not necessarily mean pursuing the same track as the leading example.

As pointed out above, there were various moments in European history, when craftsmen, merchants, rulers and governments compared the performance of their business or state and proposed improvements, referring to copying, catching-up or overtaking of more advanced competitors. Comparing the state of government administration and political economies became common in the course of modern state building from the 16th to the 18th centuries (Hirschi 2005; Hont 2010).

However, in the course of history catching-up has been infiltrated by the dominating discourse on the 'Industrial Revolution'. At the turn from the 18th to the 19th century, the concept of copying and taking over advanced technologies faced conceptual limitation in space and scope, reducing catching-up development to the take-over of the Western model of industrialization, that is the factory system by the so-called backward regions or states. Both contemporary and retrospective observers argued alongside this hierarchy. 'Civilizations without machinery'[5] were simply declared backward; if they were attributed capability to improve (= develop) at all, catching-up policies aimed at implementing techniques, organizations and institutions, modelled along Western standards. On these premises, climbing up the steps on the ladder of 'progress' appeared feasible. The criteria to assess success and failure were set by the most advanced, that is the British, later on also other, Western nations. Although the overall aim was imposed by the forerunners' endeavor, necessity and criteria for catching-up were equally accepted by the so-called backward side, and advocated in the development discourse.

At the core of any concept of modernization and catching-up was the perception of a deficit, a lack, a deficiency or blockage of economic and social development that could be measured in quantitative and qualitative terms at the level of a polity. The opinions strongly differ about the reasons for the gap to

[5] According to Sills '... features of the colonial situation are: domination of an alien minority, asserting racial and cultural superiority over a materially inferior native majority ... A non-Christian civilization that *lacks machines* and is marked by a backward economy ... And the imposition of the first civilization upon the second' (Sills 1968: 1–6).

come into existence between the proponents of Western modernization theories and proponents of dependency theories; they argue within two diverging theoretical and methodological models, using an entirely different terminology (Senghaas 1977; Arrighi 2002).[6]

Table 4. Backwardness – Peripheralization

Backwardness	Peripheralization
Reference for deficits and deficiencies	Difference resulting from interaction
Method: Indicators allowing comparison	Indicators allowing to study relations
State of retardation	Process of peripheralization
Deviation from the road model	Core formation and peripheralization
Regatta model of single nation states	System model

The proponents of the 'backwardness' model of analysis attribute the deficiencies to lacking internal capacities for modernization, a blockage due to geographical, human and institutional factors, in particular political elites which reject modernization in order to maintain their privileges. They suggest external intervention and integration into modern world markets to overcome blockages (*i.e.,* association) (see Table 5).

The proponents of the 'peripheralization' model of analysis interpret deficiencies as the result of an unequal interregional division of labor, which translates existing regional differences into regional disparities. Stronger regions are able to establish mechanisms and profit from appropriating value from weaker regions, which eventually face peripheralization at the same time. As the cause for the deficit is rooted in the dependent relation with the core regions, overcoming dependency aims – at least temporarily – at diminishing the exposure to external pressure (*i.e.,* dissociation) (see Table 5).

Table 5. Catching-up Discourse and Developing Strategies

Catching-up discourse	Development strategies
Causes for the deficit	Strategies to overcome (catch up)
Backwardness Deficit due to lacking internal capacities for modernization	Integration into international markets, thereby profiting from external incentives (FDI, trade, technologies, *etc.*)
Peripheralization Deficit due to polarization (core – periphery), resulting from the integration of less developed regions into an unequal division of labor	Diminishing the pressure of stronger competition by protecting internal markets, support of domestic industries, regulation of external exchange

[6] For a more recent introduction into the elaboration of development theories see Fischer, Hauck, and Boatcă 2016.

However, the analyses of the causes for the deficit and development strategies, pursued by state or regional governments, or propagated by political and national movements, do not compulsorily conform. Development strategies show a variety of measurements to achieve catching-up, depending on:

1) size and geography of a unit;
2) resources and economic structure;
3) international position;
4) role in global commodity chains and production networks;
5) historical moment to implement development strategies.

Like Alexander Hamilton (1757–1804) in the United States, the German economist Friedrich List (1789–1846) advocated delinking from British competitive pressure and proposed protectionism for German industry to become competitive themselves (List 1959). Both authors argued against free trade because of its peripheralizing effects on less competitive participants and pleaded for the protection of domestic industries (dissociation, focusing on internal markets) in order to gain a competitive position before opening the German national economy towards external markets in a next step (association, focusing on export markets) (see Table 5).

In order to overcome what he labelled the 'backwardness' of Austria-Hungary, the economist Alexander Gerschenkron considered state regulation as a necessary means for the Habsburg Empire to catch up with the West at the end of the 19th century (Gerschenkron 1977, 1966). He argued, the later a state started to introduce big industry, the higher the necessity of state regulation. Gerschenkron introduced the concept of 'organized capitalism' as a means to economic modernization in late 19th-century Germany and Austria-Hungary.

Dieter Senghaas and Ulrich Menzel elaborated a typology and sequence of catching-up strategies, based on broad empirical data of various European states, aiming at overcoming the British challenge, which they extended to non-European states for the 20th century. They considered the historical moment to be more decisive for the choice of strategy than theories or ideologies. When state capitalism was the dominant (appropriate) form of catching-up for the late 19th century Central Europe (and the United States), catching-up in the 20th century Eastern Europe and vast parts of the Third World required state socialism, or another type of developmental state, as a stronger means of development policy. The typology also stresses the switch from one model to another in the course of the catching-up process. Senghaas and Menzel identified the following types of catching-up (1830–1980) (see Menzel 1988; Senghaas 1982; Komlosy 2012), based on different dynamics:

1. Dissociation and internal market priority (the 19th century: Belgium, France, German Empire, Austria-Hungary, the United States);
2. Association and export priority (Switzerland, the Netherlands);

3. Association, followed by dissociation (Sweden, Denmark, Norway, Finland, Canada, Australia, New Zealand);

4. Internal market priority under state capitalism (the 19th century: Russia, Japan);

5. Internal market priority under state socialism (the 20th century: the Soviet Union, Mongolia, China, Eastern European Peoples Democracies, Yugoslavia, Albania, socialist Third World countries);

6. Various catching-up strategies of (non-socialist) developing countries, pursuing and combining association and dissociation, export-promotion or import-substitution.

This typology ends around 1980 and therefore is not able to assess the moment, when the share of the global product declined in the Global North (or West) and rose in the Global South, primarily due to catching-up success of big states with large, rapidly growing populations, reversing the position of forerunner-role model and catching-up agency. Grinin and Korotayev interpret this shift to express 'convergence' of the former developing countries, based on GDP comparison. At closer investigation the statistics show that the diminishing (in the case of China reversing) gap between Western and emerging countries goes hand in hand with growing disparities within the Global South, low-income developing countries deepening the gap with Western high-income countries, but falling behind the emerging nations of the Global South (on statistical evidence see Grinin and Korotayev 2015). Due to the increasing integration into global flows and commodity chains in dependent positions of suppliers of raw materials and cheap industrial labor, they remain developing countries. They try to pursue type VI of catching-up strategies, aiming at minimizing dependency by balancing their relations between Western and Chinese interests.

Whether the strategies focus on internal markets or export markets, and whether they rely on free markets or the state (eventually a socialist state) to regulate catching-up, most development strategies share a common aim: the upgrading of economic structures (impacting and interacting with political and social structures) in order to achieve endogenous growth. In many cases dissociation and association are not seen as antagonistic strategies, but represent the instruments of catching-up, which can be combined simultaneously, that is for different sectors, or which can follow each other, that is import-led growth following a period of delinking, or protection for building up industry following a period of export-led growth.

Table 6. Development Strategies between Association and Dissociation

Dissociation	Dissociation /Association Association / Dissociation	Association
Focussing oInternal Markets (INT)	Import-led growth (ILG) Export-led growth (EXG)	Focussing Export Markets (EXP)
Liberal market regulation	State capitalist regulation	State socialist regulation

To assess success or failure, we do not only need quantitative and qualitative indicators, but criteria for evaluation, depending on:

1) goals of catching-up: maximalist (achieving a core type structure) – minimalist (developing certain branches, competences, technologies);

2) time span: How many years does it require to upgrade economic structures? How many years does an upgrading success have to persist (before a necessary adaption/modernization) in order to be regarded successful?

3) cyclical shifts: Can up-grading that is limited to a cyclical upswing or downturn be regarded as catch-up success? Or does successful catching-up require the capacity to overcome a crisis and adapt to a new arrangement/type of accumulation?

Limits and Deficiencies of the Catching-Up Debate

At the turn of the 18th and 19th centuries, when the modern Western-centric notion of catching-up took shape, the debate began from clearly universalist grounds, declaring the idealized Western way of development to be the common one, ready to direct developing efforts of countries/regions, which had not (yet!) entered factory production, in the right direction. What was perceived to be right and wrong depended on a very narrow empirical experience, overshadowed by developmentalist, universalist ideologies, conceiving 'progress' as the expansion of Western, industrial civilization into all parts of the globe. Previous positive assessments of non-western civilizations were reversed into prejudice, disdain and a feeling of superiority, giving way to their 'orientalization' (see below).

Developmentalist advice conflicted with colonial interest. Since the colonies served to provide the motherland industries with cash crops and raw materials, industrial development of the colony was not on the agenda of colonial administration. Some economists and politicians tried to argue, why colonial practices benefited the colonized, hence legitimizing conquest, occupation and exploitation with the build-up of transport, administrative and school infrastructure in the colonies. Indigenous elites partly followed this discourse, while others opposed dependency and developed resistance. In Latin America, where the native population was strongly diminished and marginalized, creole elites became opposed to the global system under European and US dominance and

advocated national development after gaining political independence in the first half of the 19th century.

In general, catching-up debates were aimed not at the colonies, but at independent states with a later start of industrial modernization, both in Europe and in European off-springs such as the United States, Canada, Australia, or Argentina; they were also taken up by modernizing elites in Russia and Asian Empires, who had an old tradition of 'industrious' manufacture but aspired Westernization. Only when colonialism was challenged, catching-up aspirations became part of the anti-colonial agenda; after de-colonization catching-up policies entered the political arena in a broad variety of developmental aspirations.

The framework and reference of catching-up was modern economic growth. Depending on the political system, social and institutional aims became part of national development programs. After World War II, when the 'Third World' states were built along the Western concept of nation state territoriality, the realization of national development projects was embedded in a Cold War – development nexus (Westad 2007: 89). Development strategies had to cope with the long shadow of coloniality, on the one hand, and with new spaces of maneuvering, opened by the conflicting interests of old and new great powers, on the other hand. Following the ideas of the Third World Movement founded in Bandung in 1957, postcolonial governments and statesmen were able to take advantage of the great power competition between US and USSR and to a certain extent realize their development aspirations without overcoming existing international inequalities in power and wealth.

In the post-World War II and post-independence decades improvement of terms of trade and export income and the build-up of industrial manufacturing enjoyed priority in national development strategies. The ideas of delinking and import-substitution gave way to regional cooperation and joint initiatives to strengthen developing countries' agency in UN organizations. In the 1970s, delinking came under pressure of multinational corporations globalizing commodity chains, which transformed the conditions for catching-up. Like suppliers of raw materials, low-end contract manufacture in global commodity chains caused a downturn in development. Some governments were able to transform their initially subaltern position in the international division of labor into opportunities for upgrading, allowing to evolve from a developing into an 'emerging' country. Industrial upgrading started in the first tier of Asian 'tigers', followed by a second tier in Asia as well as some Latin American countries. The economic reasons for success are manifold and cannot be separated from political conditions, both internal ones – strong and effective government support – and external ones – geopolitical motivations of great powers to back up certain states for reasons of anti-communist containment. China's 'Opening and Reform' brought a 'great leap forward' because of Maoist legacies, a strong com-

munist party managing China's upgrading towards a core in global capitalism. Like in the case of Great Britain, each trajectory of emergence has its specific moments and conditions; neither is it possible to generalize it nor attribute it to delinking or globalization solely.

The limits of catching-up strategies are evident, however. Historical macro-statistics which suggest a convergence process (Grinin and Korotayev 2015) only reflect a part of reality. Many developing countries were trapped in various blockages in the course of their postcolonial attempts to build up a self-reliant national economy; they faced colonial heritage as well as on-going neo-colonial activities of their former colonial power or other Western states and institutions, carrying on dependency into the new era of national independence. Studying the reasons, why catching-up failed and did not lead to a successful implementation of modern political economies, resembling the first industrial nations, enables us to question the underlying concepts and means. In spite of the failures, catching-up remained a widely acknowledged, prominent issue until today, underlying any national as well as regional or global United Nations development goal declaration.

From a global perspective catching-up got trapped within the Eurocentric framework of stages of development (Arrighi 2002; Komlosy and Hofbauer 2019). Although opening possible paths of development beyond Western understanding, the concept of catching-up was squeezed by classifying the 'Industrial Revolution' as a necessary precondition for modernization. It became deprived of serving as a more open term for economic development and social advance.

For single units of the world-system (regions, nation states) ascent, take-off, shift from periphery to semi-periphery or core, or vice versa may (and did) take place. A single unit can improve, or worsen its position:

– vis-à-vis other units of the world-system (synchronic catching-up);

– vis-à-vis a previous period of time (diachronic catching-up).

The circumstances and conditions of success require specific case-by-case evaluation, which can contribute to a set of policy recommendations how to manage catching-up against the restraints of neo-colonialism and competitive pressures.

If core formation and peripheralization processes in global capitalism are inseparably related and produce each other, catching-up (in the sense of overcoming polarization) is impossible, however. From a state encompassing, transnational or world-systemic perspective 'backwardness' is not due to exclusion, but to dependent inclusion into the world-economy, requiring replacement of the static term 'backwardness' by the dynamic term 'peripheralization'. Correspondingly, a core must not be seen as a 'status' achieved solely on the grounds of its internal strength or superiority, but as the result of 'core-formation pro-

cesses' embedded in interregional or international relations which – at the same time – correspond with the processes of peripheralization.[7] In the framework of global capitalism this means that successful catching-up reproduces regional imbalances in new forms.

It goes without saying that catching-up does not overcome inequality, neither between nor within states. It can only be perceived as success, if the perspective is limited to the ascending party. From the side of polities, who lose previous advantage or surrender against competing efforts to catch up, gaps remain, may widen, and therefore revive or prolong the necessity to take the next effort; so catching-up will enter the agenda anew. Catching-up remains a permanent challenge even for those peripheries, which were able to improve their position. Once success in a specific field of development has been achieved, they often face a situation in which features of dependency and peripheralization occur in a new field. This can be observed in the case of industrial development, which many 'Third World' states were able to realize, becoming 'Newly Industrializing Countries' (NIC). Industrial development was restricted to sectors that had lost their leading position in innovation and value-creation in the Western cores; or manufacturing had lost its leading position vis-à-vis knowledge-based sectors, turning the success of industrial catching-up into a new disadvantage. China, to a lesser extent India and some other so-called *next* or *swing* states with high growth rates were able to enter modern knowledge-based sectors, putting the West under competitive pressure or surpassing it. Apart from the rising inequalities within these states, Grinin and Korotayev's finding of 'convergence' can be confirmed; as their population outweighs smaller emerging and (least) developing countries, the 'Great Divergence' indeed turned into a 'Great Convergence' from the 1990s and 2000s onwards (see Grinin and Korotayev 2015). This finding does not inform us about the quality of catching-up in a single state, however. To evaluate whether catching-up in growth led to a catching-up in development requires including qualitative indicators as well. This is why I do not see divergence between Global North and South to be overcome, let alone the new divergence, which will eventually subordinate the Western 'Former Industrial Countries' (FIC), once economic catching-up of newly emerging cores will be complemented by political, military and cultural supremacy.

Peripheralization and Orientalization

Returning to the historical period of European colonial and trade expansion, it is important to consider the relationship between peripheralization and orientalization. In general, the idea of catching-up is overshadowed by oriental-

[7] The author is following the World-System concept and terminology as proposed, among others, by Immanuel Wallerstein (2011) and Terence Hopkins (1977).

ization. Following Edward Said (1978), 'orientalization' is understood as an attitude assigning deficiencies to peoples or polities who do not correspond to the Western model of modernization. They are declared to be the 'other', thus contributing to the re-assertion of the Western self-perception as being superior, legitimizing foreign intervention, rule or domination. Speaking from a position of presumptuousness about others, supposedly less developed, less civilized people ('savages', 'barbarians', 'natives') is a common phenomenon in history. It got a new facet, when in the 19th century civilizations, which until then had enjoyed high esteem and admiration by Western observers (Arab, Muslim, Chinese, Confucian …), were portrayed and labelled as despotic, traditional, not capable to modernize from within.[8] The term 'orientalization', initially used to describe the Western making of the Arab and Muslim world's deficiencies, lost its regional connotation and became a general term, used to characterize similar processes defaming non-Western societies as inferior while confirming the West's superiority (*Ibid*.).

Table 7. Coping with orientalization

Ascribing deficits	Counter-strategies to overcome deficiency ascription and imbalances of development
Defining somebody (a polity, an ethnic group, a nation) as unable for development because of internal deficiencies or blockages against modernization. Deficit invention serving as a form of legitimizing dominance, hierarchy and intervention in the name of stability, civilization or development	Rejecting being characterized by deficiencies legitimizing inequality as well as civilizing (development) strategies: a) challenging the necessity to modernize according to Western models; insisting on difference/particularity as a positive sign of distinction; b) strengthening the existing endogenous and/or cooperative potential to overcome peripheralization

Critiques of orientalizing practices were developed in the framework of postcolonial studies (Said 1978; Kaps and Komlosy 2013). They focused the discursive construction of the other on a double process of delegitimizing different cultural values and legitimating one's own superiority. As a consequence, difference, otherness was perceived as a positive category, orientalizing a way to discredit it, blaming the other for a lack of modernizing potential. To strive for catching-up was seen as a way to accept the Western scheme of assessing progress, comparison between developed and underdeveloped societies as a method to establish superiority. Both the concept of backwardness and the concept of peripheralization were rejected for accepting Western paths and values

[8] By the authors with very different political views such as Karl Marx, Max Weber or Karl August Wittfogel (see Kaps 2014).

as guiding principles for development. Moreover, Said also rejected world-system and global history approaches for promoting Western epistemic concepts (Said 1986).

From this perspective the peripheralization and the orientalization approaches appear irreconcilable. While postcolonial theory blames critiques of inequality for reinforcing Western supremacy, socio-economic approaches blame postcolonial discourse orientation for legitimizing inequality and accepting hierarchy and dominance by stressing the right to particularity, rejecting the necessity and the legitimate aim to overcome poverty and underdevelopment. However, there is a way to reconcile the two approaches, eventually overcoming the limits of each of them. Rejecting the dominance, exercised by discursive ascriptions of supposedly inferior features, is a necessary precondition for any critique of social inequality. Political economists could expand and sharpen their analysis by taking up the postcolonial challenge of their own orientalizing contributions. Critique of orientalizing or othering practices should not stop at the discursive ascription. Discursive ascription or invention of deficits is an important element, complementing political, military or economic ways to establish colonial dominance. They must not be isolated from socio-economic and political-military means, but should be seen as a double (or multiple) way to establish global dominance (Kaps and Komlosy 2013). Core and periphery formation does not only take place at the socio-political level, leading to social polarization; it also impacts and relies on the construction and perception of images categorizing the role of different social and political actors, involved in the process. Realizing the correlation between socio-cultural and socio-economic processes of core-formation and peripheralization will hopefully allow perceiving the permanent remaking of 'self' and 'other' in a process of mutual interaction. So each side can only be identified and understood through the prism of its relationship with others, hence necessitating a global, all-encompassing frame (*Ibid.*; Boatcă and Spohn 2011).

The concept of 'backwardness' therefore has to be abandoned. In order to make sure that the concept of 'peripheralization' does not equally reproduce the deficit trap, peripheralization processes must be analyzed together with the processes of orientalization (Komlosy 2012). If the signs and indicators of peripheralization are acknowledged, dynamic historical methods are required to analize peripheralization as an entangled process, in which external and internal actors have been involved. Peripheralization has always been accompanied by deficit invention, or orientalization, in order to legitimate 'civilizing missions', which allow transforming 'backward' regions into places for the extraction of goods and values, as well as for the West to confirm the feeling of superiority.

This plea for reconciling the two approaches is not limited to the level of analysis, but to strategies as well. Accepting the pluralism of paths, as postcolonial analysis suggests, as a necessary prerequisite for endogenous development can help developing strategies of social and economic improvements,

which do not comply with Western models (Boatcă 2016). As a consequence, catching-up may re-widen its meaning and overcome the fixation on copying Western models. Instead, it may open the ways to strengthen internal potentials of a given region, as well as cooperative potentials striving for balanced division of labor overcoming dependency and developing self-reliant paths of development.

In the light of reversed positions of 'West' and 'East' in the process of converging economic indicators, orientalization has to be reconsidered. Will the Western orientalizing self-understanding of civilizational superiority be given up, once the supposedly inferior societies catch up or converge? In the long run, a reversal of deficit ascription is possible and Eastern or Southern values might become the benchmark to evaluate progress and success. We already can observe the elements of involuntary self-orientalization in Western discourse, when politicians or media refer to Asian competivity that prompts the West taking over Chinese assiduity, work-ethnics or acceptance of surveillance culture. Conversely, in the short run, we can observe a reconfirmation of orientalizing attitudes in Western leadership and public opinion, carrying on orientalizing disqualification of non-Western societies against the evidence of their successful catching-up. There is no evidence for similar expressions of superiority in East Asian societies, which seem to be more tolerant in accepting diversity; moreover, they have been adapting Western values to their own cultures instead of rejecting them.[9]

Business Cycles or Long Waves of Modern Economic Growth

Catching up is first of all a process, which is conceived from the perspective of a single political entity, usually the nation-state, in comparison to other polities. International statistics give broad evidence from comparative measuring and ranking. Very often they are organized in a way, that they count the distance of all participants (in competition perceived as regatta) from the unit of reference, taken as the basic line. In a long-term perspective one can measure the changing position between leading units and those lagging behind.

The territorial reference of a state, or city, supra- or sub-state administrative unit cannot be given up, if relative positions are to be marked. Taking polities as units of reference does not necessarily attribute much power to state policies and institutions to influence the outcome of ranking. Economic or regional policy is subjected to antagonistic interests from within the state, competing for the means and the goals of interference. And it is subjected to an international set of conditions, determining the maneuvering space for any political intervention. In a narrow sense, the success of development policies may be limited or

[9] This question deserves closer investigation with regard to different non-Western civilizations.

opposed from within the state or from outside actors and competitors, who interfere in market mechanisms, political and legal regulations, including international business and monetary organizations. In a broader sense, these determinants depend on the international political situation, the state of the global economy and the respective position of the single unit in question. Times of war, competition, hegemonic conflict, embargo or sanctions offer different opportunities than times of settled power relations that encourage peaceful cooperation in spite of inequalities. Sanctions may also have unintended consequences, for instance supporting the search for import-substitution instead of relying on open markets. The state of the global economy is a complex set of conditions, requiring the analysis of the role, the contribution, the function and the competitiveness of the respective unit in comparison with others. It also requires assessing the interdependencies and the mutual relations in order to define the manoeuvering space of each actor. In other words, considering the possibilities of changing positions requires taking account of international relations and global influences.

Therefore catching-up is also considered as a process, which affects a group of states, for example states representing core, periphery or semi-periphery of the world economy. Based on selected indicators, historical macro-statistics are able to measure their relative position, identifying the trends of convergence and divergence (Grinin and Korotayev 2015; Maddison 2001; Milanovic 2016).

Business cycles or long waves of modern economic growth are a useful tool of analysis for embedding rise and decline of single units into the broader framework of the world economy. Business cycles rely on observations which were modelled by economists such as Nikolai Kondratieff (1926), Joseph Schumpeter (1939) and others, after whom respective cycles were named (Kondratieff 1935; Bornschier and Lengyel 1992; Freeman 2001; Grinin, Korotayev, and Tausch 2016; Komlosy 2019). The cycles reflect the periodic transition between upswing and downturn periods of the world economy, resulting from inherent limits of competition and chances of reconstruction after a depression. Critiques reject them for being mechanistic and determinist for not taking into account the power relations and the changing environment, which allow or prevent renewal and regeneration after a crisis. Given the empirical evidence of cyclical shifts, mere rejection does not convince. Business cycles are complex models: they reflect changes in technology, energy source, lead sectors, and labor regimes in order to overcome a depression and kick off a new upswing. Each author selects a specific set of indicators to operationalize them.

Each long wave of modern industrial development was characterized by a specific lead sector, accompanied by a specific resource, energy and labor regime, a technological pattern of manufacture and a division of labor on the shop floor, relating to the international system of supply, location and selling markets: cotton textiles (1), railways and steel (2), food, chemistry and electri-

cal engineering (3), automobiles and petro-chemistry (4), information and biotechnology (5). The model provides a framework that relates the major lead sectors and their respective inventions and regimes to the cyclical movements of the world economy, which are identified as the main drivers for innovation, change and successive broadening and differentiation of the industrial landscape. They also reflect the cumulative developments and inter-sectorial linkages in the course of the industrialization process. Until today, in standard economic history, five Kondratieff waves have been identified. More recently, taking into account the latest technological and organizational innovations, scholars discuss the conditions of a sixth Kondratieff wave under way, fuelled by the transition from the Industrial production principle towards production and services based on the operation of self-regulating systems, labelled cybernetics or artificial intelligence (Grinin L. and Grinin A. 2014: 361).

Basically, spatial impacts of long waves build up on the theory of the product cycle (Vernon 1966). As long as an industrial product requires research and development, production is centred at core locations. When no more technological progress is required, return diminishes and manufacturing is ready to move to locations with cheaper costs. This is the moment when peripheral locations can take over technically matured manufacture, while the cores enter new, more profitable sectors of industry requiring innovative research. In spite of outsourcing manufacturing, control stays at the headquarters. When profitability moves to new sectors in the cores, technologically matured, fully developed sectors offer the possibility for developing countries to acquire industrial facilities in less profitable sectors.

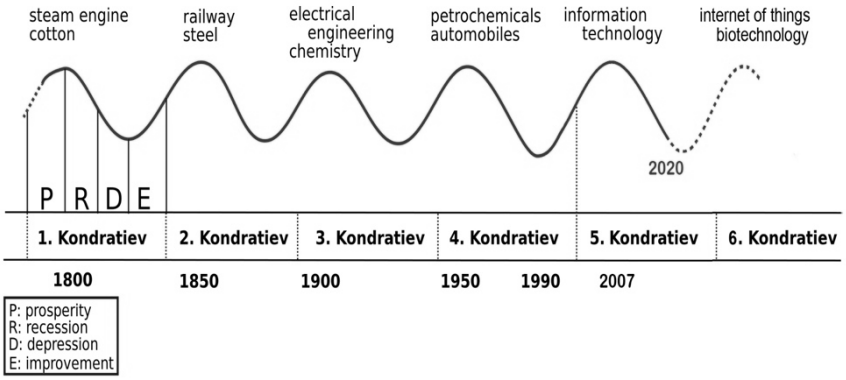

Fig. 2. The five Kondratieff cycles

Source: URL: https://en.wikipedia.org/wiki/Kondratieff_wave (30-11-2018), own adaption.

Initially, the concept of business cycles did not transcend the Eurocentric narrative of the British born then Western 'Industrial Revolution'. In fact the shifting cycles can be interpreted as a sequencing of 'Industrial Revolutions', not only demonstrating the start but equally the pattern of consecutive sequences, necessary to run through for everybody who wanted to stay at or reach the top. The concept reproduced and refined the idea of stages of economic growth, based on lead sectors, represented by leading polities, fuelling the necessity to catch up from the side of those states whose economy was exposed to competitive pressure by the leading ones.

In fact, long waves or business cycles were only conceived for core economies, neglecting colonies and non-Western states. The historical sequencing of leading sectors, as undertaken by business cycle analysis, neglects the connection of time and space as well as the polarizing tendencies resulting from the unevenness of developments. It risks obscuring the entanglement of industrializing processes within sectors (commodity chains) and between sectors (supply and spin-offs) in different parts of the world economy at every single moment of history. It leads to a linear perception, according to which the forerunner is demonstrating what is to become the future of the followers, or using Karl Marx's well-known statement on India: 'The industrially most developed country does nothing but hold up to those who follow it on the industrial ladder, the image of its own future' (Marx 1867[1976]). If considered at all, dependent regions in history were supposed to follow the path of their respective motherlands, supplying them with raw materials, energy, manpower or whatsoever. Agriculture, although a major sector of industrial transformation, was not included into the considerations, although food crops from peripheries have always been a major input into societies specializing on factory manufacture.

As long as catching-up efforts of developing countries were made within a core-periphery structure of the world economy that was dominated by the so-called developed Western countries, business cycles remained a Western means of perception and analysis. Once former peripheral or semi-peripheral states started to overcome peripherality and engaged in taking a leading position in a new long wave, business cycles ceased to be a Western concept. So far this was only the case in the course of the fifth Kondratieff wave, when Chinese companies entered as low-end suppliers of global commodity chains, but moved up to higher ends and to more value-adding sectors, challenging the Western centrality for the first time in the history of modern Kondratieff waves[10]. It is still a highly debated question, whether or not China will be successful in becoming a type of core region that will be able to define the nature of a next Kondratieff wave (Nolan 2014; Komlosy 2016a). A business cycle under the lead of an Asian core or an alliance of Global South states like the

[10] Unless one extends business cycles in periods of time prior to Western hegemony, as proposed by George Modelski and William Thompson (1996) or Frank (2015).

BRICS-states (Brazil, Russia, India, China, South Africa) does not contradict the historical narrative of the long wave idea, initially shaped by the European then Western model, the benchmark for all others when engaging in catching-up, however. Against the decline of U.S. economic and hegemonic power, it is most likely that a forthcoming global upswing will take place under a new, probably East Asian, leadership.

Globalizing Catching-up

In world-systems analyzes, the concept of long wave, business cycles were adapted along the basic assumptions of this approach. Following the Kondratieff framing, medium-term cycles or long waves were relating the transformations on the time-axis with the transformations in the spatial arrangement of core and periphery formation within the world-system (Modelski and Thompson 1996; Hopkins and Wallerstein 1977; Bornschier and Lengyel 1992; van Duijn 1983). Long waves, as modelled in a world-system understanding, emphasized the impact of upswings or crises on core-periphery relations. In an upswing new regions or sectors were incorporated into the international division of labor, controlled by the core, delivering raw materials. During crises cores risked losing lead positions, while peripheries – and more so to the pending semi-peripheries – acquired opportunities of catching-up along with the shifting technological and organizational arrangements of the international division of labor.

From a world-system perspective on global capitalism, capital accumulation results from the spatial imbalances between cores and peripheries, including various intermediate positions such as semi-peripheries.[11] Cores rise to their position upon their capacity to appropriate transfer value from regions, which undergo peripheralization in the process of their subordinating, often forceful integration into the uneven international division of labor. In this respect they are attributed the passive role of a victim; their activities are limited to the degree of cooperation with core states or corporations. Only when peripheries and semi-peripheries were able to turn peripheral incorporation into the basis for an eventual ascent, their agency grew. The conditions, which are favorable for such an ascent (= catching up), are subject of development studies – differing according to underlying development concepts and strategies, however.

Why some cases succeed in catching up and others do not, cannot be assessed from case studies alone. It requires taking account of the changing relations among old and new cores as well as hegemonic leadership according to historical developments and cyclical pattern. While an A-phase is shaped by a new leading sector arrangement in cores, including peripheries solely as suppliers of resources, a B-phase multiplies the functions peripheries fulfil for the

[11] Most recently discussed in Nolte, Boatcă, and Komlosy (2016); Boatcă, Komlosy, and Nolte (2018).

core, which offers more occasions to overcome peripherality. Some peripheries become tapped for additional resource extraction, requiring the build-up of new transport and communication infrastructure, others serve as cheap outsourcing locations for those core industries which are no longer profitable in the core because new sectors or fields of activities had taken over the lead. Initially under core control, some peripheries may find a way to move up the commodity chain, from a low-end supplier to a more controlling and value-adding position at the high end of a chain, albeit at the expense of new geographical patterns of peripheralization (Fischer, Reiner, and Staritz 2010; Bair 2005, 2014; Komlosy and Musić 2020).

The meaning of 'industry' has been changing over time. At the beginning of the factory system, industry referred to the production of manufactured goods in power-driven factories. Trade and service activities were attributed to the service sector, which steadily increased its share of total economic output, capital valorization and employment. Outsourcing of industrial production to cheaper locations went hand in hand with a shift of industry to peripheries, while knowledge and service-based parts of production remained in the cores. This shift gave way to the interpretation that the former industrial cores were facing a transition from an industrial to a post-industrial economy – a term coined by Daniel Bell (1973). Conversely, commodity chain approaches rather emphasize the transformation of industry from integrated all-inclusive factories to a composite form of industrial organization based on network of locations contributing 'just in time' to the final product. Some are so-called 'producer driven' manufacturing companies, others are set up under the control of 'global buyers' (Bair 2005, 2014; Fischer, Reiner, and Staritz 2010; Gereffi and Korzeniewicz 1994). Global buyers consist of big retail companies or owners of labels that outsource single steps of production according to wage levels, qualification requirements, tax, environment, and labor regulations. These locations build networks or chains including all steps of production from R&D, manufacture to marketing and distribution. In spite of their decentralized location along the commodity chain and the uneven distribution of profits and benefits, they form a unit.

The ascent from a periphery to a semi-peripheral or a core position represents a form of catching-up. Hence, instead of conceiving catching-up as linear sequence, the cyclical approach helps globalizing and embedding catching-up into the shifting relations between core and periphery formation. Catching-up inter-related both in time and space. Different from the universalized stages of development, represented by the Eurocentric model of modernization, the world-system version focuses the legacies of peripheralization, preventing peripheries from pursuing the same trajectories as the cores. Therefore, it does not emphasize catching-up as a pure imitation of a core. In this conception the rise

of peripheries to semi-peripheries or semi-peripheries to cores does not solely result from internal efforts and political support, but of changing core-periphery relations, allowing a change of position.

Cyclical turning points support these shifts, allowing for a change of competitive positions, which impacts both old and new cores and always varies the foundations, on which lead, competitiveness and dependency become effective. Grinin and Korotayev (2015) suggest relating critical turning points in the relation between global cores and peripheries into a broader, long-durée narrative. Similar to other global historians and economists, they identify the 1820s as the period, when Western states' GDP growth left former leading Asian economies behind, initiating the so-called 'Great Divergence'. From 1980 onwards divergence gave way to converging GDP. According to Grinin and Korotayev, the potential of convergence has been starting taking shape from the very moment of divergence onwards. While the gap was still growing, the experience of divergence contributed to the idea of catching-up on the part of the colonized and exploited. According to the authors, divergence had also been preparing the grounds and delivering the means and methods until catching-up turned into convergence. I think this narrative is convincing, on the one hand, for linking processes, which are usually analyzed independently from each other, on the other hand, it underestimates the persisting and newly arising imbalances, resulting from divergence and convergence processes, especially in those states and regions, where divergence does not give way to convergence.

Medium-term Kondratieff cycles of approximately 40–50 years (or less), the so-called long waves, each composed of upswing (improvement, prosperity) and downswing (recession, depression), the downswing preparing the path towards a new upswing, were embedded into long-term hegemonic cycles (Braudel 1988; Frank1998; Nolte 2009; Hopkins and Wallerstein 1977; Wallerstein 2011) or cycles of accumulation (Arrighi 1994). Although long waves consider shifting positions between cores, peripheries and semi-peripheries of the world economy, hegemonic or accumulation cycles refer to a geopolitical shift from one hegemonic power to another one, including long periods of competition for hegemony, uncertainty or the existence of multiple hegemons. According to Antonio Gramsci, hegemony is a form of dominance, in which the ruling power is acknowledged by the ruled, forming a kind of asymmetric consensus (McNally and Schwarzmantel 2009). While Gramsci developed the concept with regard to the political and cultural hegemony of a political party or a social movement within a given state (in this case interwar Italy), his followers put it on the geopolitical level of the inter-state system, defining a hegemon as the one power among the core states that is accepted by his allies, his competitors as well as his rivals and enemies as leading power in economic and military as well as cultural respects.

Long Waves and Hegemonic Cycles

Hegemonic shifts and medium-term cycles interact insofar as hegemonic decline or vacuum usually goes hand in hand with a decline of the hegemon's core position in the global economy, not only opening the possibility to replace it in its function as an economic core as well as in its function as a global geopolitical leader.

The ideal sequence within a hegemonic cycle goes from a period of formation (up), which is characterized by competing powers for hegemonic succession, to a period of maturity, in which hegemony is still contested, and to the peak period, representing hegemony proper, in which no other power is able to contest hegemony. Geopolitical overstretch, recovery of core competitors, successful catching-up of semi-peripheries and other developments undermine the peak, giving rise to hegemonic decline (down), characterized by multiple aspirants for hegemonic succession (Taylor 1996). Like long economic waves, hegemonic cycles are the product of empirical observation, moulded into a model. Within this general framework, geopolitical analysts use different criteria to characterize a cycle compared to economic historians, who rather emphasize the economic background of change and transition. World-system scholars make use of hegemonic cycles as constitutive elements of their model. Hegemonic cycles differ in length and quality and therefore cannot predict the future. And there is no certainty that the next sequence will take place as may be assumed from previous cycles. At a given moment of the upward or the downward cycle, contemporaries can neither be sure about the outcome of competition nor about the continuation of the cycle at all. There have always been alternative options, for example aspirations to replace a system governed by a single hegemon by a multilateral governance of international relations. From local and regional perspectives, cycles may seem too vague and general, ignoring particular developments.

Table 8. Long waves and hegemonic cycles

Hegemonic cycle	Kondratieff A-Phase	Kondratieff B-Phase	Hegemonic cycle
UK-upswing	1790–1820 Textile industry	1820–1850	UK-victory
UK-maturity	1850–1873 Railways, steel industry	1873–1896	UK-downturn
US-upswing	1896–1914 Electrical, chemical, and food processing industries	1914–1945	US-victory
US-maturity	1945–1973 Petrochemical industry, car manufacturing	1973–1990	US-downturn
China upswing challenging the U.S. and Europe, competing with EU for hegemonic succession	1990–2008 Information and communication industries, Bio-technology	2008– Information and communication, and global transport logistics	China's development towards maturity

The literature on hegemonic or accumulation cycles traces the development of capitalism from a Genovese to a Dutch, to a British, and to a US cycle, leading to an East (and South) Asian renaissance (Arrighi 1994, 2002; Frank 1998; Grinin and Korotayev 2015; Komlosy 2019; Taylor 1996; Wallerstein 2011). East (and South) Asian decline corresponded to the rise of the West, at the turn of the 18th to the 19th century represented by Great Britain. The East Asian renaissance corresponds to the decline of US hegemony and the rise of China as an economic core, and eventual future hegemon, at the beginning of the 21st century. This framework is a useful model to observe and discuss the rise and decline of powers that strive for, achieve or lose global hegemony, their regional basis and spatial reach as well as the methods to exercise economic lead and global control. Especially when we look at contemporary developments, there is no consensus on what the future will look like, giving rise to extensive controversial debates (Komlosy 2016b).

Instead of assessing stages of economic development within one state, as conceived by modernization theories, the stages are identified on a global scale, represented by shifting hegemonic powers. However, the focus of hegemonic cycle models is on the timeline of change, and not on synchronicity. It usually follows the cycle from the perspective of the ascending power, neglecting what is going on in other parts of the system. Vice versa it can also be looked at from the perspective of a declining hegemon, evocating former 'greatness', as one can observe in the British (Hausteiner 2015) and the US case (Huhnholz 2014). Focusing on synchronicity would imply looking at different participants of the global political and economic system and analyzing their specific story from the perspective of hegemonic change. What did happen in the Mediterranean and Upper Germany, when the cycle moved to the Dutch world? What did happen to the Mediterranean and Dutch worlds, when the cycle moved to the British (formal and informal) Empire? The hegemonic or accumulation cycles can serve as a general framework but they neglect the manifold regional attempts of business and state actors to acquire lead in a particular sector, to defend a competitive position or to catch up. Moreover, business as well as hegemonic or accumulation cycle narratives are trapped in a core perspective. Only when changes in the governance of the world economy occur, windows of opportunity for (semi-)peripheries to catch up receive interest.

A new globalizing perspective was introduced by Andre Gunder Frank, Kenneth Pomeranz and others initiating a debate on the 'Great Divergence' (Frank 1998; Pomeranz 2000). Up to that moment, most modern Western historians did not consider (East) Asia as a genuine agent of modernization. Acknowledging competence, or even admiring Asian skills of government, mercantile and technological innovation prevailed until the 18th century (with very poor empirical knowledge about them), when it gave way to disrespect and

disdain, blaming Asian Empires for 'despotism', 'stagnation' and general incapacity to modernize along the Western universalized path (still not knowing more) (Osterhammel 1998). Instead, Western sciences became preoccupied with self-assertion of Western superiority, which became evidenced by its capacity to achieve the 'Industrial Revolution'. From there, superiority was traced back into history, constructing more or less racist explanations for 'European exceptionalism' (Jones 1987; Landes 1998).

Asian ruling and intellectual elites were split over these allegations. Some took over the Western perspective, striving to westernize according to the supposedly universal pattern; others rejected the pressure to modernize or insisted on developing Asian paths of modernization, eventually incorporating Western elements into local and regional trajectories. Whether they liked it or not, they were forced to take account not only of Western incursions into their societies but equally of Western orientalizing ascriptions, accepting, rejecting or adapting them to their situations. Coping with Western supremacy strongly differed in the case of India,[12] which became a British colony in the 19th century, and China,[13] which was able to maintain imperial sovereignty. The Asian debates were hardly perceived by Western academia until in recent years a new global history with active involvement of Asian scholars, many of whom worked at Western universities, rejected the Eurocentric narrative burdening world history since its beginning during European Enlightenment (Chakrabarty 2008; Chaudhuri1990; Deng 2016; Hamashita 1994; Kaveh 2017; Pankaj 2012; Parthasarathi 2011; Roy 2005; Sugihara 2005; Wong 1997; *etc.*).

During the global turn in history Western scholarship also finally discovered the strong Asian competitive position at the time of the emerging 'Industrial Revolution'. Instead of considering the West as the only centre of competence accumulation, Asian regions from West to East Asia were acknowledged for their leading world-economic role up to the 18th (in the case of Ottoman Empire, Persia and India) and the 19th century (in the case of China and Indochina) (Frank 1998; Pomeranz 2000). The discovery of similar levels of industrial development and standards of living in English and Chinese regions in the 18th century (*Ibid.*) was helpful in overcoming the myth of Western superiority at the beginning of the 'Industrial Revolution'. According to Pomeranz, the

[12] In India the imperial past gave way to: 1) anticolonial positions, blaming colonialism for its legacies that have to be overcome by independent leaders' efforts; 2) postcolonial positions that see a continuity of coloniality in contemporary politics; and 3) revisionist positions that acknowledge the contributions of colonial governance for economic modernization, education and state-building (see Chakrabarty 2008).

[13] Due to the fact that China did not face direct colonial rule, scholars were less occupied with analyzing the imprints of foreign domination on Chinese elites. Discussing China as a part of the world-economy or the world-system is therefore rather the exception (see Weigelin-Schwiedrzik 2005).

divergence was mainly due to the British access to fossil fuels and to colonizing networks allowing the appropriation of key raw materials and foodstuff imports from the Global South. Pomeranz's revision of the Eurocentric narrative of European exceptionalism was labelling the 'California School' approach because of his employment at the University of California, Irvine for twenty years. His book title also gave the name to one of the most fervent social science history debates on the reasons and timings of the 'great divergence' between Asia, that fell behind and Western Europe that took over global leadership in the 19th century (Vanhaute 2016).

Andre Gunder Frank (1998) who is often addressed being part of the 'California School' without ever having an academic position in California, went even further than Pomeranz by suggesting Asian global hegemony prior to the 'Industrial Revolution' and extending the period of East Asian supremacy until the 1860s in his book *ReOrienting the 19th Century* (2014). Acknowledging Asian decline as a consequence of Western expansion – a narrative that was dominant in critical historiography and sociology in the 1970s and 1980s – did not fit into Frank's concept and was therefore downplayed. On the contrary, Asian success was seen as a principal factor kicking off the first British 'Industrial Revolution' by triggering the search for ways to circumvent Asia's strong economic and hegemonic position. Frank insisted that China's decline was the result of internal contradictions of rapid growth, caused by a Chinese downswing preceding the rise of the West. By promoting China's, and to a lesser extent India's achievements, his aim was to make Western achievements look insignificant. He wanted to put the narrative of the 'Industrial Revolution' upside down and replaced the idea of a capitalist world-system led by Europeans, to which he had contributed in earlier years of his life, by a Chinese hegemony until the 18th century. This ambition prevented him from attributing a leading role to Western achievements in the early modern period from the 16th to the 18th centuries, as conceived of in the standard world-system narrative.[14]

World-system scholars were divided over Frank's revisionism.[15] Reducing the period of Western hegemony to hardly one hundred years (*c.* the 1860s – the 1960s) provided arguments for the re-rise of China as a global player at the end of the 20th century, though. It also bridged the gap between the world-systemic periodization of global capitalism arising in the late Middle Ages and coming to the fore with European transatlantic expansion, and those economic

[14] See Komlosy's preface to the German edition of Frank's *ReOrient* (2016).

[15] Frank's *Reorient* (1998) received a strong response ranging from positive esteem (including translations) via diverse critiques to complete rejection, the latter coming from close world-system scholars (see reviews by Samir Amin [1999], Giovanni Arrighi [1999] and Immanuel Wallerstein [1999]), as well as from colleagues with a critical stance vis-à-vis world system concepts (see, *e.g.* Vries 1998; Chase-Dunn 2015 and other participants of the Review Symposium in *Journal of World-Systems Research*).

historians who interpret capitalism as the expression of modern economic growth, resulting from the introduction of the factory-system during the 'Industrial Revolution' (O'Rourke and Williamson 1999). Liberal economic historians do not agree with Frank in many other respects, however.[16] Peer Vries, although elaborating the high level of Chinese manufacture in his own works, blamed Frank for neglecting the role of the state and therefore not being able to assess the divergence between European capitalism, based on the active support of entrepreneurship by state institutions, and Asian Empires, where states did not interfere into fostering productivity rise (Vries 1998, 2013, 2015). Other authors pleaded for a compromise, acknowledging the contributions of Western science and innovation in building up the foundations to catch up with East Asia in the 15th – 18th centuries, until time was ripe for the 'Great Divergence' of the 19th century (Chase-Dunn 2015; Goldstone 2009; Grinin and Korotayev 2015). They argue, although Asian societies were leading in many respects until the 19th century, Western science did not only catch up in the number of innovations, but showed greater aptitude in empirically applying new scientific knowledge into the world of production.

In spite of different positions of the single authors, the 'Great Divergence' debate broke with the Eurocentric, Euro-exceptionalist narrative denying Asia's active and leading role in the world economy. Many scholars pointed at the Asian continuity of labor-intensive, 'industrious' modernization, surviving and resisting colonization and representing a distinctive path of modernization, independent from Western Industrial Revolutions. Other authors pointed at the rapid take-over of Western technology and entrepreneurial spirit, inspiring Asian elites to transform foreign domination into political independence and/or economic self-determination.

Inspired by the 'Great Divergence' debate, Western world history underwent the shift from the colonialism – dependency paradigm towards acknowledging the strong and influential role of Asian societies in the world economy. Moreover, the idea of strong Asian traditions gave rise to studies analyzing Western efforts to introduce the factory system in the context of global competition and the Western strive to overcome Asian superiority in various branches of trade.

Mechanization and centralization of industrial production and wage labor in factories ('Industrial Revolution'), backed by protection and conquest of markets, was itself a strategy of catching-up of Western European states against the industrially more advanced Asian producers at the end of the 18th century. If the 'rise of the West' was a consequence of global interactions, encouraging

[16] See, *e.g.* the controversy between Frank, William McNeill, and David Landes at the occasion of Landes's work (1998).

the imitation, substitution and replacement of Asian manufacture on domestic and export markets, the myth of an 'endogenous capitalism' could no longer be maintained. As a consequence, there are numerous efforts to re-evaluate the 'Industrial Revolution' from a global perspective, challenging old patterns, models and narratives. They may liberate the idea of catching-up from its Western-centric constraints, including the dogma of implementing a Western type of 'Industrial Revolution' as a means of catching-up.

Acknowledging India and China an equal or even leading role until Great Britain's industrial and hegemonic take off blended into the debate about hegemonic or accumulation cycles, in particular into the first Kondratieff cycle that coincided with the British rising global leadership.

Therefore, the 'Great Divergence' was assessed as a key turning point that allowed the first British 'Industrial Revolution' to occur, triggering the cycles modelled by Kondratieff and others. Once started, the cyclical movement was considered as being driven by inner Western developments and contradictions, giving way to a sequence of 'Industrial Revolutions', all of them under Western dominance. This narrative brought about an overemphasis on 'divergence', finally providing arguments for the Western success. But it had difficulties explaining the renaissance of Asian tigers from the 1950s to the 1980s and the more recent resurgence of China (and to a lesser extent India) as the gravity centers of the world economy.

Another reading of the 'Great Divergence' is possible, as Frank advocated in his last book, which he could not complete before his death.[17] The rise of the West can be understood as a process, which required constant inputs and movers, not only by extraction and asset transfers from the colonized world, but also by on-going (mainly) Asian answers to cope with Western competitive pressure, which prompted colonizing counter-measures as well as the promotion of industrial modernization with local Asian faces. Looking at how Asian economies met the Western challenge at different conjunctures of long waves and accumulation cycles can help arrive at a narrative of synchronous entanglement of the parties involved in the cyclical movements of world economy and its geopolitical power structure. Moreover, not only in Asia the long waves of leadership and decline require adaptation and relation with regional and sectorial moments of unevenness.[18]

[17] Frank's work (2015) was dedicated to reviewing previous Frank's *ReOrient* concepts.

[18] There is a broad consensus that Europe and Asia were privileged actors in the world-economy since the 15th century, when the Americas and Africa were step by step incorporated as peripheries into a world-system, in which North America became a core in the 19th and a global hegemon in the 20th century. There is no consensus about the question, whether or not and until which moment Asia played a hegemonic role in this world-system. South America, the Caribbean, the Pacific Islands and Africa are often reduced to the position of exploited victims in this debate.

Combining Spatial, Temporal and Sectorial Entanglements

A global history of industrial development will have to combine the spatial with the temporal character of uneven development. Instead of a linear perception, which neglects regional imbalances, unevenness must become the key element to understand the historical development of industry in different parts of the world. It follows that writing a global history of industrial development requires taking account of the 'synchronicity of the non-synchronous'.[19]

What are the consequences for future framing of uneven and combined development studies?

The investigation sets in at the time of the onset of the 'First Industrial Revolution', marked by the introduction of the factory system. This event is taken as a decisive rupture not because of the revolutionary character of the changes, which ever since have been strongly overemphasized. Even in Britain they only concerned a small part of the population and the economic landscape; factory production for a long time coexisted with other forms of craft and home industries, manufactories and putting-out systems, wage labor being combined with other paid and non-paid forms of work, including the household (Komlosy 2018). The industrial transformations in Britain did have consequences on a global scale: not only did British factory products, first cotton yarn then followed by other branches, set pressure on manufactures, craft and home production all over the world, prompting them out of the market or adapting specific strategies to stay competitive (Beckert 2014). Factory products and their productivity also set the standards for the evaluation of any manufacture production. Having or not having experienced the 'Industrial Revolution' was the one and only criteria for progress. Even today, as industrial (mass) production is significant for emerging economies, the post-industrial cores are still referred to as 'industrial countries', attributed because of their participation in the 'Industrial Revolution' and their successive industrial diversification.

The term 'Industrial Revolution' should therefore not be detached from the historical context of British, respectively Western lead and hegemony. It is a purely Western phenomenon, imposed on the whole world, which is transformed into degrees of deficit, none, bad or better performance, graded by Western standards and institutions, and therefore must be abandoned in order to liberate the discourse from its burden. I do not see a way to conceive of catching up developments anywhere else to conform to the benchmark requirements of the 'Industrial Revolution' made in Britain. Conversely, catching-up can

It is unclear, what kind of repercussions the synchronous inclusion of these world regions into the 'Great Divergence' debate would bring along. It definitely lies beyond this article.

[19] The idea was developed by the German philosopher Ernst Bloch in 1953 and became a metaphor in social science history to express the spatial unevenness of development in different part of the world (see Komlosy 2010: 624).

serve as a useful analytical tool to grasp the permanent regional shifts in economic and technological leadership and inspiration.

The term ‘catching-up’ is also linked and overshadowed by the linear model of stages of industrial development reducing it to undergo consecutive phases of ‘First, Second, Third and Forth Industrial Revolutions’. However, this term seems less cramped and opens the possibility to be used in a more open form, applicable to diverse forms of seminal inventions and advancements. It does not overcome the idea of linearity of progress, achieved in stages. It argues within the capitalist, industrialist system of capital accumulation, driven by the necessity to improving one's own (company or state) position vis-à-vis others. However, the idea of catching-up is open to acknowledge manifold actors in this process, and does not exclude non-European players or the European periphery by definition.

Finally, I propose to apply the concept of catching-up to the British ‘Industrial Revolution’ as well as to other European or Western industrializing core states' achievements, hence placing them on the same level with other catching-up candidates. As a consequence, each successive phase of Western ‘Industrial Revolutions’ must be assessed in terms of catching-up with non-Western developments. Long waves and hegemonic or accumulation cycles can be used as a structure that requires emphasizing spatial inequalities at each cyclical transition including multiple locations (old cores, competing cores, new cores as well as peripheries and semi-peripheries striving to improve their position).

In a world-system framing, business and accumulation cycles allow assessing moments of divergence and convergence, movements of expansion and contraction of the world economy on a global scale. To make big history feasible, systemic framing also requires local and regional dimensions. Competition represents a form of dialogue – action, reaction, and adaption – which is not only shaped by global players and global hegemons, but also by local and regional core-periphery relations, interrelating with the global sphere. Leading as well as catching-up actors, their achievements, strategies and failures, require rooting in a specific social and political environment. This is the moment, when politics – state regulations and measurements to promote catching up – come on the research agenda.

Following long wave business cycles privileges leading sectors of the core, shaping the accumulation process at a specific moment. In order to avoid a mono-sectorial reduction, the variety, the number and the linkage effect of leading and other sectors, both the regional interaction and the interaction along commodity chains, have to be emphasized. Mono-sectorial specialization and/or a lack of inter-sectorial interaction in specific regions must be framed in a transnational division of labor context. Which carrier branches were guiding catching-up during the preponderance of a leading sector in the core? How did various sectors differ in interrelating high- and low-end positions along commodity chains?

Focusing synchronicity of various functional locations and sectorial arrangements at a specific cyclical moment is a key issue. If cyclical development is not conceived as a succession of independent consecutive stages, but as an overlapping process, in which older layers coexist and eventually merge with newer ones, we have to consider the multiplication of synchronicity in the course of the historical process. Each cycle adds new combinations (Norkus 2018). In other words, each moment of catching up refers to an already existing sectorial setting. If it is not purely copying this setting, it produces synchronous non-synchronicity, characterized by the coexistence and combination of advanced and outdated sectorial arrangements, with on-going sectorial complexity contributing to a more and more differentiated pattern of global and regional stratification.

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Appendix

Table 9. Long Wave Business Cycles According to Kondratieff Revolutionary Lead and Catching-Up: Timing and Characteristics

Kondratieff Cycles	**A-phase 'Revolution'** A Lead sector B Energy source C Lead technology D Labor regime E Lead regions	**B-phase 'Catch up'** A Regions B Catch up carrier branches C technology D commodity chain position	**Key Inputs from Global Peripheries**	**Core Reactions vis-à-vis Catch up Attempts**
Kondratieff 1 **A 1790–1815** **B 1815–1848**	A Cotton textiles, Iron B Water (and steam) C Spinning machine, Puddling process D Mechanized mills with wage labor E Lancashire and other early industrializing nodes	A EU-West, US-North B Textiles C Water power (and steam) D combined with putting out and homework in rural areas	Iron and ores Cotton Coal Charcoal Agricultural and food crops	Former leading Asian manufacture regions are not taken into account in Long Wave models, neither the loss of their export markets, their transformation into commodity frontiers nor their industrious resilience
Kondratieff 2 **A 1848–1873** **B 1873–1895**	A Railways, Steel, Machinery B Steam C Dispersing mechanization D Fully integrated factories E EU-West, US-North: Territoriality and transport infrastructure	A Austria-Hungary, Russia, Japan B Railways, Steel C Steam D EU-West, US: Relocation of mature industries to internal peripheries	Iron and ores Steel Cotton, Wool Coal Charcoal Agricultural and food crops	Capital export, imperialist expansion, colonial conquest and/or informal rule US, Germany challenging GB leading core position Balanced, world-encompassing European great power rivalry
Kondratieff 3 **A 1896–1918** **B 1918–1940**	A Electrical engineering, Chemistry, Food, War industries B Steam, electricity C Processing technology	A EU-East, Mexico, Brazil, Turkey: B Textiles and consumer industries A Soviet Union	Iron and ores Steel Alloys Cotton, Wool Coal Agricultural and food crops	Exploding great power rivalries, obliging colonies and satellites to support imperialist powers Post WW I

Continuation of the Table

	D Taylorism, Fordism, war management impacting civic post war reconstruction E EU-West, US, Japan	B Heavy industry C Stachanovist Fordism		national liberation, new states and catch up attempts (Import Substitution Industry, export led growth). Great Depression re-opens new alliances in great power competition
Kondratieff 4 **A 1941–1973** **B 1973–1990**	A Weapons, Automobile, Petro-chemistry B Energy mix C Automatization, D Fordism, Toyotism E US-EU-Japan, Socialist and Developmentalist Import Substitution Industries (Comecon, Mao China, Asian Tigers, Latin America)	A Developing countries B Low end textile-garments, electronics C Low tech, low wage contract manufacture D Industrial relocation replacing self-reliant import substitution China: Opening and Reform	Oil, Gas, Coal Iron and ores, Steel, Alloys Cotton, Wool Agricultural and food crops Industrial components and consumer goods	Post WW II switch from GB to US hegemony. US decline after 1973 is bolstered by collapse of SU/Comecon, compensating the effects of global restructuring of commodity chains and industrial outsourcing to developing and emerging countries
Kondratieff 5 **A 1990–2008** **B 2008 – ?**	A Computer software Information technology Biotechnology B Energy mix C Digitalization D Flexibilization, informalization, just in time regimes E US-EU-Japan challenged by China catching-up	A China and other emerging economies B From low to high-tech and high value industries C Entering Research & Development D commodity chain control and governance at the expense of least developed countries	Raw material extraction industries (see above) Contract manufacture components (chips) and labor-intensive products	Old Western cores face industrial decline, but still control commodity chains; mobilize military power and local conflicts to maintain dominance over emerging economies and rivaling partners

Sources: Bornschier and Lengyel 1992; van Duijn 1983; Freeman 2001; Grinin L. and Grinin A. 2014; Grinin, Korotayev, and Tausch 2016; Kondratieff 1935; Modelski and Thompson 1996; Norkus 2018; Schumpeter 1939.

Table 10. Catching-Up: Typology and Chronology

Period	Type and Case of Catching-Up	Political Events	Catch-Up Carrier Branch	Kondratieff Wave: Lead Sector A-Phase B-Phase	Former/ Competing Cores' Reactions
1780–1820	GB, EU-West vis-à-vis Asian regions: protectionism, state support for industrial upgrading	Napoleonic wars	Cotton, iron	K1A: new carrier branches face factory-industrialization during upswing (cotton, iron)	Continuity of industrious manufacture in Asia; loss of global export shares
1820–1850	EU-West, US-North vis-à-vis GB: protectionism, state support for industrial upgrading	Formation of liberal nationalism in European core states; Opium War (1842); British rule in India (1857)	Cotton, iron	K1B: new carrier branches spread to catching-up states and regions, while old cores look for new sectors leading the next upswing (steel, railways)	Continuity of industrious manufacture in Asia GB: From protectionism to free trade and global hegemony
1850–1873	Russia, Japan vis-à-vis EU-West, EU-Central and US-North	The Crimean War (1853); Kanagawa Treaty (1854); Opium War (1860)	Iron, steel Railways Cotton	K2A: Cotton, rail-way, steel	Continuity of industrious manufacture in Asia GB faces EU-West and US-North industrial competition in new lead sectors

Continuation of the Table

Period	Type and Case of Catching-Up	Political Events	Catch-Up Carrier Branch	Kondratieff Wave: Lead Sector A-Phase B-Phase	Former/ Competing Cores' Reactions
1873–1896	Russia, Japan vis-à-vis EU-West, EU-Central and US-North respectively *vs* each other Selective factory-industrialization in Asian and Latin American metropolitan regions	Classical imperialism: capital export to internal and external peripheries, run for raw materials and colonial conquest (The Berlin conferences in 1878, Balkan; in 1884 in Africa)	Iron, steel Railways, Cotton	K2B: Russia and Japan catch-up in K1A and K2A lead sectors. In the meanwhile: Electrical engineering, chemistry, surrogates, food processing proceed to lead in the cores	Older sea-based cores compete for colonies; Germany and US realize territorial consolidation, develop surrogates for colonial raw materials. Asia: continuing labor-intensive industries
1896–1912	Russia, Japan, Germany, Austria-Hungary, US vis-à-vis GB	Scramble for Africa; Russia-Japan War (1894); Western military intervention in China (1901)	Fin de Siècle re-finement of arts and manufacture Heavy industry Electrical engineering, machinery	K3A: Electrical engineering, chemistry, surrogates, food processing	Asia: pressure on market-opening from joint West, provoking search for combining Asian with Western type industrial modernization
1912–1922	Great power competition for hegemony, while catching-up aspirations move to new EU-East states after World War I	Hot wars; Russian Revolution; changing state borders and new states	War industries	War industries (weapons, explosives, chemistry, automotives, aircraft industry) War management	Sea- and land-based empires fall back vis-à-vis US

Continuation of the Table

Period	Type and Case of Catching-Up	Political Events	Catch-Up Carrier Branch	Kondratieff Wave: Lead Sector A-Phase B-Phase	Former/ Competing Cores' Reactions
1918–1939	Soviet Union vis-à-vis EU-West and US (Agrarian) EU-East nation states vis-à-vis former empires Turkey, Mexico, Brazil Japan and Germany vis-à-vis West	Civil War and Western interventions; Peace treaties and new state foundations cannot resist German expansionism; Crisis 1929/31 opening maneuvering space for developmental states in the South; Empire consolidation and enlargement aspirations	Heavy industry, infrastructure, consumer industries until subordination to NS war regime. Light industries, infrastructure; broadening of national industrial basis; heavy industries, weapons	K3B: Political turmoil, collapse of empires, new state formation and reconstruction priorities do not allow to identify a regular pattern of lead sectors and catch-up carrier branches	Ongoing colonial rule in Africa and Asia and Middle East GB (+F) remain empires, but lose hegemony to US; Germany contests competitive disadvantage (peace treaties) by partly perching on SU to overcome military restrictions
1939–1945	Great power rivalry overshadows and instrumentalizes EU-East small states' national catching-up ambitions	World War II; Germany's and Japan's global expansion aiming at geopolitical catch-up of Western empires	Heavy industries, weapons	Overlapping of K3B (for GB) and K4A (for US; for Germany until surrender)	German invasion of Soviet Union and Japanese attack on US forging a temporary alliance of anti-German, anti-Japanese forces, neglecting small states' sovereignty

Continuation of the Table

Period	Type and Case of Catching-Up	Political Events	Catch-Up Carrier Branch	Kondratieff Wave: Lead Sector A-Phase B-Phase	Former/ Competing Cores' Reactions
1945–1973	SU and Comecon; Mao-China (1949); Independent India; Asian Tigers; Developing countries in South America, Africa and Asia Between import substitution (ISI) and export price stabilization to catch up vis-à-vis EU-West and US	Reconstruction; Cold War; Western interest to contain communism and support anti-communist neighbor states; Formation of Third World (Bandung 1955; Non-Aligned Movement 1961; UNCTAD 1964)	Heavy industry; agroindustrial modernization (food processing, textiles, other consumer industries); aiming at as complete as possible spectrum of industrial branches	K4A: Automobile Petrochemistry	Soviet type redistribution puts pressure on core capitalist states to concede to labor protection and social security; US support for decolonization and integration into US led global order; Former colonial empires maintain control over ex-colonies
1973–1990	Second Tier Tigers of East and South Asia, South America EU-East: Subordination of ISI catch-up to low-end positions in globalized commodity chains	Formation of competing economic trade blocks and supra-states, associating Developing Countries as suppliers of raw materials and industrial processing; China's Reforms and Opening (1978);	Outsourcing matured and labor-intensive industries from the West to EU-East and Third World	K4B: New International Division of Labor: Relocation of manufacturing to Global South, keeping lead in the North, based on R&D, headquarters and control of global commodity flows	Build-up of global governance institution beyond nation-states (Multifibre Agreement 1974, Investment Protection facilities, WTO, *etc.*) to control the selective

Continuation of the Table

Period	Type and Case of Catching-Up	Political Events	Catch-Up Carrier Branch	Kondratieff Wave: Lead Sector A-Phase B-Phase	Former/ Competing Cores' Reactions
		Developing countries foster South-South cooperation			opening of core markets for component supply, while discriminating against industrial competition from the Global South
1990–2008	EU-East hoping to catch-up by EU accession faces limitations, for example peripheralization. While Developing Countries face a set-back in catching-up by 'Economic Partnership Agreements', China manages moving up from contract manufacture to higher value adding and skill branches, setting up core-periphery relations with developing countries	Collapse of Comecon and Soviet Union 1989/91; European Union Eastern Enlargement 2004ff; The Cotonou Agreement (2000); The End of Agreement on Textile and Clothes (2004); Emerging countries enter international arena (*e.g.,* G-20) claiming representation and multipolar world order	Relocation of low skill (textile-garment, electronics) and high skill (car) manufacturing, while added values remain in EU-West, US and Japan; decline of former industrial regions leads to social polarization and unrest	K5A: information and communication, biotechnologies, transforming former industrial cores into postindustrial ones	Market expansion into EU-East and post-Soviet states allows compensating world-economic crisis and industrial restructuring

Continuation of the Table

Period	Type and Case of Catching-Up	Political Events	Catch-Up Carrier Branch	Kondratieff Wave: Lead Sector A-Phase B-Phase	Former/ Competing Cores' Reactions
2008–	Re-emergence of China as global economic core; BRICS and other emerging nations' cooperative catch-up attempts	Multiplication of wars and interventions as a consequence of Western attempts to control competing emerging nations	China: From contract manufacture to strategic player in global commodity chains; communication, logistics and transport infrastructure	K5B: Will emerging nations be able to catch-up with knowledge-based R&D? Will they continue cyclical patterns of rise and decline or find a more equal and sustainable pattern?	Restructuring of global commodity chains and technological advance of Global South undermines Western capacity to renew hegemony