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Society Shapes Industrial Policy, Industrial Policy Shapes Society

Karl Aiginger
University of Economics and Business, Vienna, Austria
Policy Crossover Center: Vienna-Europe, Vienna, Austria

ABSTRACT

Industrial Policy has been defined and performed in very different ways over time and across countries and continents, along with its aims and scope. Instead of repeating these controversies, the article starts with the emerging consensus that systemic industrial policy should support societal priorities and that instruments should be used which maximize synergies with other policy strands. A future-oriented industrial policy should also no longer maximize national priorities, but goals should at least be shared with neighboring countries. Realistically, we have to acknowledge that it will remain a weapon in the competition between superpowers and those who want to defend or gain this status. Industrial Policy will also be different in emerging countries with low income and education, a high agricultural share, and persistent gender differences, compared to that in highly industrialized countries. Industrial policy leads to and requires structural change, with causality running in both directions. Its shape will influence the "future of capitalism", and the socio-ecological system will define the content of a systemic and integrated industrial policy.

Keywords: Systemic Industrial Policy, Future of Capitalism, Competition between Superpowers, Lead in Environmental Policy

OBJECTIVE AND OUTLINE OF THE ARTICLE

This article documents the ongoing transition of industrial policy from a separate and heavily contested narrow policy line towards a central pillar of any socioeconomic sustainability strategy. The role of industrial policy, as well as its instruments, must be adapted to the new challenges of globalization, digitalization, and climate change, but equally to the ever-changing forms of inequalities and the upcoming new world order with China in the lead. The article builds on past articles by the author and the European WWWforEurope project (Aiginger and Rodrik 2020; Aiginger 2007, Aiginger 2016), but also includes recent evidence and new policy communications of the EU and international organizations. It remains a work in progress, however, due to constant changes in the world economy, ecological challenges, new technologies, and the impact of populism, nationalism, and pandemics.

The next section provides an overview of the content, definition and importance of industrial policy across countries and over time, including a pledge for a systemic policy instead of a narrow-focused approach. Section 3 reports ten principles of industrial policy for the 21st century, as summarized recently. That this cannot be the end of the discussion is shown in section 4 by addressing the challenges of well-known goals, which however require more urgent responses. Since industrial policy should be driven by societal goals, section 5 speculates

about the unknown future of a new world order – how it is both shaped by and affects industrial policy. The last section summarizes.

INDUSTRIAL POLICY IN THE PAST AND PRESENT: CONTROVERSIES AND DEFINITIONS

Industrial policy has always been controversial

The dichotomization between the French approach – selecting and favoring special sectors – and the German approach – providing framework conditions only – has been highly debated between left and right leaning experts in Europe. In the US, many economists claimed that no industrial policy was the best policy.

The EU Treaties favor the horizontal approach, but in later communications a sectoral differentiation was added. Europe intervened heavily in the aircraft industry, enabling the success of Airbus. From Europe's perspective, this was the breaking up of a US monopoly, which itself was a spinoff of the military sector. In economists' language, the support for Airbus was the fight against a monopoly profiting from spillovers of the military sector. Smaller national aircraft companies could not generate the needed economies of scale and scope to compete with Boeing, given that past investments constituted sunk costs.

Japan´s rise from a wrecked economy after the Second World War to an industrial powerhouse was based on selecting, financing and supporting key technologies and firm clusters (in keiretsus) steered by a powerful MITI. It thus approached the top productivity of the US, enjoying a large trade surplus and developing the just-in-time model, which did not only revolutionize the car industry. Japan´s policy was to some degree imitated by other East Asian countries. The Japanese model became unattractive after certain "lost decades" at the end of the last century: "corporate Japan" disfavored startups, foreign intellectual and physical inward investment and inward migration. Equality of genders, including diverse management, was disregarded; the negative impact of male, old-age networks could not be compensated by strong industry clusters or the change from MITI to METI. Competition policy preventing the negative consequences of monopoly power was not applied in Japan, or at least much less so than in Europe.

China continued to steer its economy and society according to five-year plans, which adapted the sectors to be preferred and problems to which the communist party paid the highest attention. It succeeded in shifting from an agrarian to an industrial economy in a very short time. China imported technology but steered foreign investment into special zones and forced investors to share their technology in joint ventures. It chose industries in which China could take the lead, such as electric cars or photovoltaics. "China 2025" set the goal of switching from the supply of cheap goods to sophisticated ones like machinery, environmental technology, and biotech, and then the strategy of "China 2049" – named according to the anniversary of the year in which the Communist party assumed power - proclaimed the long-run mission to become the leading Socialist superpower by the middle of the century.

The US proves that no industrial policy can be a trap. The US has accrued a significant trade deficit, not only with respect to China but also with respect to Europe, and there is evidence that the Protectionism tried under the Trump administration proved to be no solution. An implicit industrial policy – not steered by societal goals – favored the exploitation of oil and gas resources, including problematic horizontal drilling techniques or dangerous platforms in the

sea. Now, the technology leader US has a trade surplus in raw materials and low processed goods and deficits for high tech products. Interventions that disregard emissions and the preferences of citizens for clean air are ignored due to lobbies financing politicians and candidates for the presidency. This has demonstrated that an industrial policy not steered by long-run societal goals can be negative for structural change in the right direction. Nevertheless, the US is still leading in labor productivity and its firms dominate the Top-100 list in Wall Street, while many new internet platforms have been launched in the US (Andreoni and Chang 2019, Atkinson 2021).

DEFINITIONS

For an overview of the scope of industrial policy see Aiginger (2007) and table 1 below. Definitions on which most economists seem to agree contain the following elements:

- activities to promote or prevent structural change (Curzon Price 1981),
- encouraging resources to move into particular sectors important to future economic growth (Krugman and Obstfeld 1991),
- broad restructuring policies in favor of more dynamic activities, regardless of whether these are located within the industry or manufacturing per se, institutionalized collaboration and dialog between private sector, government, and civil society (Rodrik 2004),
- interventions improving the business environment or changing the structure for better prospects for economic growth or welfare (Saggi and Pack 2006),
- Fostering industrial development, in accordance with a society´s long run rise of living standards (Peneder 2017).

The ambitions of industrial policy thus differ with respect to the assumed extent of the knowledge of the government (and its experts) and with respect to technology and demand trends. Superior knowledge is needed to select "future industries" and "best technologies", or to predict demand shifts. Horizontal policies require less knowledge and only the prediction of growth theory that broad activities like research and education generate dynamic external effects, in the sense that the expenses of one firm are also beneficial to non-investors.

If industrial policy is to be shaped by societal needs, it is important to switch from the traditional economic performance measure of GDP (or GNI) to the broader SDGs. Ecological goals, maximizing cooperation with neighbors, work-life balance, health, and working conditions have a higher priority than does redirecting technological progress from labor productivity to resource and energy productivity. This is called "New perspectives outcome" by Aiginger et al (2013) or, later on, "green industrial policy" (Aiginger 2013, Rodrik 2014, Tagliapietra and Veugelers 2021).

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Table 1 Definitions of industrial policy: an overview from past to present

Curzon Price, V. (1981), "Industrial Policies in the European Community".	"Industrial policy may be generally defined as any government measure, or set of measures, to promote or prevent structural change."
Adams, G., Klein, L.R. (1983), "Industrial Policies for Growth and Competitiveness", Lexington Books.	Industrial policy includes "everything which is useful to improve growth and competitive performance"
Jacquemin, A. (1983), Industrial Policies and the Community in Coffey, P., Nijhoff, M. (ed.), Main Economic Policy Areas of the EEC.	Industrial policy "has to specify and solve the problems of structural change in the economy. Its task is to create optimum conditions for the necessary structural transformations to be carried out."
Tyson, L., Zysman, J. (1983), "American Industry in International Competition: Government Policies and Corporate Strategies".	"Industrial policy ... means government policy aimed at or motivated by problems within specific sectors."
Johnson, Ch. (1984), "The Idea of Industrial Policy", in Johnson, Ch., "The Industrial Policy Debate".	"Industrial policy means the initiation and coordination of governmental initiatives to leverage upward the productivity and competitiveness of the whole economy and of particular industries in it."
Graham, H. (1986), "European Industrial Policy", Croom Helm, London.	"Industrial policies referrer to those policies intended to affect in some ways manufacturing or service industries."
Geroski, P.A (1989)., European Industrial Policy and Industrial Policy in Europe, Oxford Review of Economic, 5.	Industrial Policy is "wide-ranging, will assorted collection of micro-based supply initiatives which are designed to improve market performance in a variety of occasionally mutually inconsistent ways."
Krugman, P., Obstfeld, M. (1991), "International Economics Theory and Policy".	"Industrial policy is an attempt by a government to encourage resources to move into particular sectors that the government views as important to future economic growth."
Chang, H.-J. (1984), "The Political Economy of Industrial Policy", St Martins's Press.	Industrial policy is one "aimed at particular industries (and firms as their components) to achieve the outcomes that are perceived by the state to be efficient for the economy as a whole."
Sharp, M. (1998), "What is Industrial Policy and Why is it Necessary?", Prepared for TSER project No PL97 1059 on Science, Technology and Broad Industrial Policy.	Narrow concept "Industrial policy is often restricted to policies about subsidies." Broad concept ……as any policy affecting the allocation of resources to industry and in this sense embraces both macro- economic policy ... as well as the more traditional areas of microeconomic policy."
Foreman-Peck, J., Frederico, G. (1999), European Industrial Policy: The Twentieth-Century Experience, Oxford University Press.	Industrial policy is "every form of state intervention that affects industry as a distinct part of the economy."
Beath, J. (2002), "UK Industrial Policy: Old Tunes on New Instruments?", Oxford Review of Economic Policy, 18(2).	Narrow view: "Restrict attention to policies that target particular firms and industrial sectors." Broad view: "any policy that shapes or influences the competitiveness of a country's firms and industries
Rodrik, D. (2004), Industrial Policy for the Twenty- First Century, CEPR Discussion Paper, (4767).	Uses the term industrial policy for "restructuring policies in favour of more dynamic activities generally,

	regardless of whether those are located within industry or manufacturing per se."
Aiginger, K., Sieber, S. (2006), "The Matrix Approach to Industrial Policy", International Review of Applied Economics, 20(5), p. 573-603.	Industrial policy is the activity which creates a favourable environment for European business in general, the manufacturing sector and its industries in specific
Saggi, K., Pack, H. (2006), "Is There a Case for Industrial Policy? A Critical Survey", The World Bank Research Observer, 21(2).	interventions … that attempts to improve business environment or to alter the structure of economic activities , towards sectors, technologies or tasks …..that …..offer better prospects for economic growth or societal welfare
Esteban, J., Stiglitz, J., Lin, Y. J. (Eds.) (2013), The Industrial Policy Revolution II, Africa in the Twenty-first Century, Palgrave Macmillan, London.	governmental policies targeted at sectoral allocation of the economy….including… innovation and R&D....infrastructure…education. ..integration of markets…, enduring stability and financial policies
Friesenbichler, K. Peneder, M. (2016), "Innovation, competition and productivity in developing countries", Economics of Transition, 24 (3), pp. 535-580.	The interplay of market forces, technology and productivity in developing countries resembles that of industrialized nations.
Peneder, M. (2017), "Competitiveness and Industrial Policy: From Rationalities of Failure Towards the Ability to Evolve", Cambridge Journal of Economics, 41(3), pp. 829–858.	…interventions to foster industrial development, i.e. ….ability to evolve in accordance with a society's long-term rise of living standards

Source: Own illustration.

Demise

Industrial policy lost importance in the last decades of the 20th century. This coincided with the decreasing share of manufacturing in total value added (see table 2) which is interpreted as the result of the law of tertiarization[1] in rich economies.

Table 2 Shares of manufacturing in GDP

	Nominal value added in manufacturing			Real value added in manufacturing		
	2000	2010	2020	2000	2010	2020
	Percentage shares in GDP					
Europe	16.6	13.7	13.8	14.6	13.9	14.3
EU-27	17.5	14.5	14.6	15.1	14.6	15.2
Austria	18.2	16.5	16.3	15.2	15.6	17.4
France	14.5	10.3	9.4	11.2	10.4	10.1
Germany	20.5	19.7	18.1	19.0	19.6	19.3
Sweden	20.2	14.7	12.1	16.3	15.3	12.6
USA	15.1	11.9	10.9	12.7	12.3	11.6
China	31.9	32.5	26.5	26.0	28.5	27.6
World [1])	18.2	15.9	15.9	19.1	17.2	15.9

Note: Europe - EU-27, EFTA, Western Balkans, Russia, Belarus, Ukraine, Turkey.
Source: AMECO, World Bank. 1) Real value added for the year 2019.

[1] Tertiarization is supposed to stem from the higher productivity of manufacturing as well as changing consumer demand from goods to services (if incomes rise).

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A political driver was the so-called Washington consensus, which highlighted the negative impact of big government, high taxes, and regulations, as well as interventions for specific sectors. Europe contributed to this trend, insofar as the European Treaties favored competition and the opening of markets, thus prioritizing competition policy and the abolishment of trade barriers (European Commission 1990, 2002, 2004, 2007, 2010). Both the neoliberalism and cutting of tariffs and non-tariff barriers worldwide, were reflected in international trade and investment agreements and the WTO rules. Japan lost much steam and was outcompeted by China, which joined the WTO in 2001, with little discussion of its reliance on five-year plans and persistent priority for public-owned firms.

Comeback

To a certain surprise, industrial policy came back after the millennium. ICT proved a game changer, as it became clear that the share of "future investment" – loosely defined as research plus education plus ICT spending – stabilized the up to then predicted "secular decline" of growth rates in high-income countries. The Financial Crisis (called the Great Recession by US economists), the Euro Crisis and the further decline of the share of manufacturing added to this re-thinking. The return was further supported by the rising competition from emerging countries and the fact that China gained the top position in global manufacturing, along with a large export surplus.

Supporting manufacturing and specific sectors of high importance became attractive in the US, as the technology leader lost market shares, even in technology-intensive sectors, by outsourcing at the very first stage after the invention phase (due to insufficient cooperation between firms, which was labelled as US "firms alone at home" by Susan Berger from MIT. Excellent research clusters in the US near top universities (whether it be Silicon Valley or Route 128 near MIT) could not prevent early shifts of production to lower-income countries. US research policy was concentrated at the intersection of the industrial, military and space sectors but could not bring manufacturing "back to the US". Wrong specialization continued, as oil platforms in the sea or horizontal drilling even in populated areas made fossil resources cheap. The country with the highest per capita income specialized in resources or semi-fabricated products, increasing its deficit on technology-driven goods. A policy to buy American Goods or other home preferences in procurement (proclaimed by President Biden) cannot change a wrong specialization. This is not systemic industrial policy steered by societal priorities.

RETHINKING THE HORIZONTAL APPROACH IN EUROPE

As already told, the EU Treaty favored the horizontal approach. The ensuing Lisbon agenda declared it as a vision of Europe to become the "most competitive region of the world". This led to an industrial policy, in which sectoral as well as horizontal interventions were needed. The compromise arose that horizontal interventions would be more efficient if they differed according to sectors; as an example, the food industry needs other instruments to boost competitiveness than electronics, e.g. standardizations instead of a new production technique.[2]. A table was constructed which showed which interventions were important for which industries (which were the rows of the table). This approach was labelled the "matrix

[2] To give an idea of this, product standardization is more important in the food sector than in research. The four broad sectors proposed by the European Commission (2005) are: the food and life sciences, machine and systems industries, fashion and design, basis and intermediary industries.

approach" by Aiginger and Sieber (2006). Later, Europe defined key industries to which policy should pay specific attention (European Commission 2010).

SYSTEMIC AND INTEGRATED INDUSTRIAL POLICY

We had an overview of definitions in table 1. Aiginger (2015) uses some of the ideas, to some degree following Aghion et al (2014), to develop a "Systemic Industrial and Innovation Policy (SIIP); for this, see figure 1.

A SIIP according to Aiginger (2015) is driven by three *pulling forces*
(1) a vision of a new growth path (welfare beyond GDP),
(2) socio-economic goals (SDG goals); income, jobs, social cohesion,
(3) excellence in specific technologies.
It is encouraged by four *pushing forces*:
(1) competition, openness, and globalization,
(2) an activated, trained, and retrained labor force,
(3) competitive regional or national advantages (following Porter's ideas)
(4) climate change and ageing

These pulling as well as pushing forces will have to shape all policy lines, including trade, competition, and regional policy, but also public procurement, to name a few. The interrelations between innovation policy and industrial policy deserve special attention (as indicated by the two "I"s in SIIP). Innovation policy is one main pillar of any horizontal approach. Within research expenditures, countries try to set priorities due to existing firm clusters or university departments. Thus, innovation and industrial policy will merge, which can also mitigate the conflict between sectoral and horizontal policies.

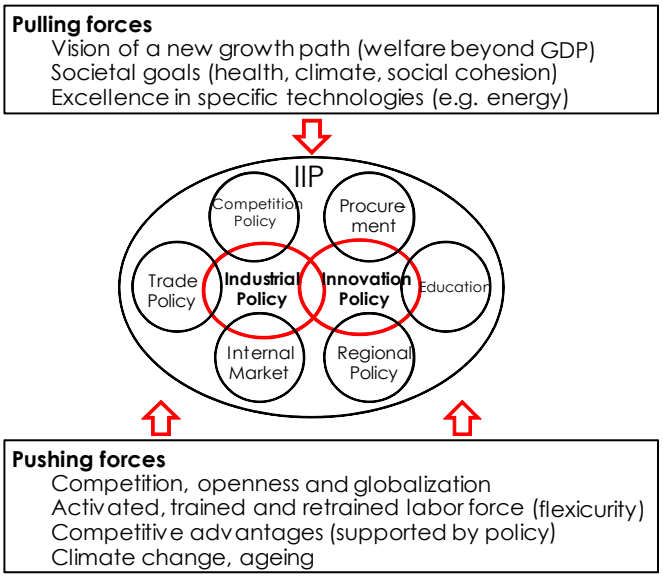


Figure 1 Structural Industry and Innovation Policy (SIIP)
Source: Aiginger and Rodrik, 2020)

THE TEN PRINCIPLES BY AIGINGER AND RODRIK (2020)

Before we discuss new challenges that have not been addressed sufficiently, along with the requests by a New World Order arising under severe uncertainty with the horizon needing even

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more robust approaches, we report ten principles of an industrial policy for the 21st century, as developed by Aiginger and Rodrik (2020).[3]

MANUFACTURING REMAINS CRUCIAL FOR GROWTH AND WELL-BEING

Even though employment in manufacturing is likely to continue shrinking in middle-income and advanced economies, manufacturing remains crucial for development and well-being. Technological progress is specifically strong in manufacturing and thus a large manufacturing sector increases the chances for better living conditions for citizens and the international leverage of a country (table 3). A "Decline of Nations" may relate to insufficient structural change and an upgrading of manufacturing. Equally, it can be the consequence of premature deindustrialization, but it often also follows from missing structural change or an overreliance on inward investment and foreign technology.

Table 3 Contribution to world manufacturing

	Nominal value added in manufacturing			Real value added in manufacturing		
	2000	2010	2020	2000	2010	2019
	Percentage shares					
Europe	26.5	26.9	23.3	19.4	17.9	17.9
EU-27	20.1	19.9	17.6	15.1	13.7	13.7
Austria	0.6	0.6	0.6	0.4	0.4	0.4
France	3.1	2.6	2.0	2.0	1.7	1.6
Germany	6.3	6.3	5.5	4.8	4.4	4.4
Sweden	0.8	0.7	0.5	4.9	4.7	4.0
USA	24.5	17.0	17.9	17.1	16.2	15.3
China	6.3	18.8	28.9	7.9	19.4	29.3
World	100.0	100.0	100.0	100.0	100.0	100.0

Note: Europe - EU-27, EFTA, Western Balkans, Russia, Belarus, Ukraine, Turkey.
Source: AMECO, World Bank.

INDUSTRIAL POLICY HAS TO BE SYSTEMIC, NOT ISOLATED OR DELEGATED TO SPECIALISTS

Industrial policy should not be an isolated policy that stands in conflict with other policy strands like competition policy, trade policy, regional or tax policy. Successful industrial policy maximizes synergies with other partial policies. Sectoral policy should use the drivers of a high-road strategy, such as innovation, education and sustainability, and horizontal policy should give a higher priority to key sectors. Industrial policy should not be delegated to special agents, ministers, and EU commissioners alone. This should be the task of the government as a whole, with the prime minister or the Head of the EU Commission in the driver's seat. The leading agents and their teams have to report and listen to parliaments, citizens, experts, and firms, while being aware of potentially being "captured" by egoistic disinformation.

THE OPTIMAL SCALE OF MANUFACTURING DEPENDS ON CAPABILITIES AND PREFERENCES

It makes no sense to set targets for the trade surplus or the share of manufacturing, as was done in an EU Communication (European Commission 2011) that calls for regaining a 20% share in

[3] For more definitions of industrial policy, see table 1.

GNP. The size of manufacturing or any other technologically advanced sector must be in line with goals, strategies, resources and living conditions. Policy distortions in the form of protectionism (to "bring manufacturing back") and the subsidization of fossil energy at the cost of nature and the environment ultimately will lower social standards and wages and increase repair costs. The participation of workers, farmers and citizens in decision-making is important, both in emerging and industrialized countries, even if there are large differences across societies and stages of development. Social partnerships, through which trade unions and other representatives of employees can participate in upgrading products and skills and improving working conditions, along with work-life balance, should be welcomed. Lobbying to extend the lifetimes of declining and dirty industries has to be curbed.

INDUSTRIAL POLICY HAS TO TAKE THE HIGH ROAD

Industrial policy for industrialized countries should follow a high-road strategy, supporting quality and sophisticated products, and develop and apply new technologies, including the Internet of Things and artificial intelligence. Facilitators of an ambitious industrial policy are excellence of tertiary education at universities or advanced high schools, an innovation system fostering radical innovation, and top clusters. Low costs and standards, subsidies for ailing industries or national champions, are detrimental to a high-road strategy, as is the old definition of cost competitiveness.

Industrial policy for developing countries has to focus on the eradication of poverty and the transition from being a low-income country to being a middle-income one. It may not initially be a high-road strategy; however, it should be kept in mind that there are development traps such as overreliance on resources and cheap labor or a specialization in products with a low income- elasticity. Industrial policy in emerging countries should foster own efforts, as well as complementary endogenous technologies. The level and types of education and innovation will change, as will gender relations. The overuse of nature, a high population concentration and urbanization, which leaves agricultural regions behind, has to be prevented, not least since this is one source of disruptive migration and populism.

REDIRECTING TECHNICAL PROGRESS AND PREPARING FOR LESS GROWTH

Today, technical progress is far from neutral; it primarily saves on labor, and often capital and resources, but there is an insufficient focus on technical progress saving energy or resources. This asymmetry is not "natural" or exogenous in the sense that technical innovations favor labor productivity, but it is policy-made. Labor is expensive, in part since the bulk of taxes is levied on labor. Pollution is not taxed according to its negative externalities, nor is transport on highways, air traffic and ships. Fossil energy is subsidized, and capital costs have been held down, specifically since the financial crisis, fostering tangible investment. Therefore, redirecting technical progress not only improves welfare and reduces the growth necessity, but also corrects the bias in technical progress created by public failures and distorted incentives.

SOCIETAL GOALS SHOULD BE PARAMOUNT, MOVING BEYOND THE CORRECTION OF MARKET FAILURES

Industrial policy has to be driven by societal goals. Correcting market failures, whether they be static (monopoly, provision of public goods) or dynamic (path dependency, neglect of the distant future and lack of international cooperation) is important, but the goals of industrial policy are wider, including market shaping and mission orientation. Regions with decreasing

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populations and underinvestment in infrastructure – together with inequality, unemployment, stagnant income and losses due to hyper globalization – are hotspots for populism and a threat to liberal democracy.

Societal goals involve climate, health, poverty prevention, good-jobs creation, and the reduction of inequality. Societal goals can be monitored by sustainable development indicators or Beyond-GDP schemes. Scoreboards and success evaluation, including the European semester, should rate innovation and well-being. The perspective of international organization as well as credit ratings by semi-private financial watchdogs should gradually converge to similar goals, even if the perspective and degree to which a goal can be attained will differ.

SEARCH PROCESS IN AN UNKNOWN TERRITORY

Industrial policy is a search process; it requires embeddedness without allowing hostage-taking. The more ambitious the goals of industrial policy are, the less government knows about the techniques available to solve them. Industrial policy is therefore a search process in unknown territory, which should be open to new solutions, experiments and learning. Therefore, government and business should engage in an intensive dialog, screening decentral information. However, government has to be aware that the information given by firms may be biased in their particular interest and the egoistic advice of incumbents.

ASIAN COUNTRIES DEMONSTRATE HOW TO COMBINE PLANNING WITH MARKET FORCES

Industrial policy can be very different, ranging from improving general business conditions to strategies close to top-down planning. The East Asian countries tend to prioritize sectors and define important technologies. Firms following these strategies get cheaper credits and higher subsidies.

INDUSTRIAL POLICY CAN MITIGATE POPULISM

Populism and nativism – in all their different manifestations in the US, Europe or emerging countries – are partly due to inefficient industrial policy. Regions facing downward spirals must develop a new strategy. This could include: inviting former citizens to return and apply their enlarged skill sets back home; improving tangible and intangible infrastructure; favoring new firms that do not require economies of scope or scale; stressing teleworking; and providing new lodgings that integrate different generations. A combination of regional, industrial, and social policies will therefore also reduce one of the root causes of populism by increasing well-being in disadvantaged regions and even districts in metropolises. For a strategy focusing on the creation of "good jobs", see Rodrik and Sabel (2019).

AN INTERNATIONAL FORUM FOR INDUSTRIAL POLICY SHAPING RESPONSIBLE GLOBALIZATION

An international forum should be established to discuss a broadly defined industrial policy with political leaders, civic organizations and firms. Industrial policy can and will be different across countries, continents and stages of development, but there are a multitude of positive and negative spillovers between countries and there is a wide scope for mutual learning. A global forum could enable parallel national strategies to stop subsidies for fossil energy and large-scale agriculture, as well as a shift from turbo-globalization to responsible globalization. It should discuss how the losers of globalization and technological change can be compensated or

even better empowered to switch to better jobs. The forum could discuss how military spending could be curbed, development assistance improved, and resource grabbing prevented. It would probably make sense for Europe to take the lead, given its strength in manufacturing and its more ambitious attempts to include social and ecological issues in industrial policy. However, the lead could gradually be shared, and the forum could support partnerships with Africa and emerging countries in Asia and South America, and of course also eventually rotate with China and the US.

Summarizing these principles, industrial policy needs a systemic approach that coordinates innovation, competition, regional, and trade policy, with manufacturing at its core. It impacts on upstream and downstream industries, and it promotes sectoral change, clusters and networks. The manufacturing sector will lose shares relative to GDP, but less or not at all if integrated with complementary services. Manufacturing, including its need for resources and the services it adds, remains a crucial part of income and welfare generation. It should be steered by societal goals that lead to sustainability and responsible globalization. Extending far beyond the correction of market failures, it is a search process into the unknown that profits from a dialogue with experts, interest groups and citizens, but must also avoid hijacking by special interest groups and populism.

CHALLENGES, VISIBLE BUT ADDRESSED WITH DELAY

How quickly pushing and pulling forces for a systemic und integrated policy change can be demonstrated by new challenges. We start with some which are far from new, but got a higher priority, since the SIIP or the ten principles just mentioned were elaborated. They need to be addressed quickly with a broadly-defined industrial policy if unrecoverable damages to our society and the planet are to be prevented.

Climate change is today acknowledged as the most dangerous challenge for our habitat; and all now agree that it is man-made. About 190 countries committed to the Paris Treaty in 2015, pledging to limit global warming "well below two degrees" as compared to pre-industrial times; out of this change in temperature one grade has already happened. Looking at the sectors most responsible for the current emissions, many would hint at manufacturing, as cities with large industrial districts are known for heavy smog and bad air. This is, however, a long-lasting cliché and to narrow a view at least for industrialized countries. Many manufacturing firms have successfully reduced their emissions. Today, the transport sector is responsible for the highest and fastest rising emissions.[4] A narrow view on causation is not possible, since emissions relate to production, transport and consumption. A systemic industrial policy is at the core of a more ambitious decarbonizing strategy which can lead the world back to the "path to Paris" Aiginger and Colcuc, 2021). Reaching that trajectory is still possible, but has to be started quickly, as has been realized at the Glasgow Conference in November 2021.

China and the emerging countries deserve a specific role in fighting climate change. On the one hand, these countries have contributed less to the cumulative emissions in the atmosphere in

[4] This holds if we include the transport of raw material and intermediate goods but also final goods for consumption produced in other parts of the world. Thus, consumption, plus agriculture, construction and energy produced with fossil fuels in other locations contribute to climate change, even if consumers are not aware of this. Calculating how much a sector emits, can be done based on production or demand.

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the past, but on the other hand emissions are still rising in low-income countries in parallel or even at a faster rate than production.

About the time of the Glasgow conference, China surprised the world with its commitment to become climate-neutral in 2060. This looks completely unrealistic in light of its current planning, including industrial policy scenarios. China plans for and needs high growth rates, and growth is still energy intensive. More coal plants are planned to produce the energy needed. Additional nuclear reactors will also not solve the problem, since new plants are expensive; the material needed for building boosts emissions and no insurance or financial investors can cover the risk of disasters or the final storing of waste. On the other hand, China has often set overambitious goals and reached them against any odds. India and Brazil or even Russia have set less ambitious goals, such as capping the increases in emissions soon or stopping deforestation sooner than later. These countries have a worse history of achieving goals. For our topic, an industrial policy has to respect the energy needs of countries wanting to catch up with leaders, but without relying only on technologies the US or Europe have previously used to gain their positions.

Digitalization is a general-purpose technology making dramatic inroads and changing structures. Labor demand and occupations are changing. Steep job losses have been predicted several times; recall the "end of labor", the forecast of a "ten-hour week" (Keynes), or the threat of a "two thirds society" (two parts employed, one unemployed), as discussed after Margaret Thatcher changed the political priorities in the UK.

Fears of lower employment due to the Internet of Things or digitalization are also no destiny. Rather than a net decline in jobs, digitalization will probably change occupations and tasks (Bock-Schappelwein 2016). Some jobs will be lost, and others upgraded or complemented by a diversified demand. There exist predictions that the demand for skilled workers would decline; but recently firms more often report that the do not find qualified persons; this might indicate that vocational training and schools provide a narrow specialization with teaching priorities dominated by memorizing and past demand. Firms now locate where qualified labor is available, not where wages are low.

Products and even houses can be designed or produced by computers (3D); this could support competitiveness, but it also raises new dangers if cars are automated, or drones deliver material and parcels to a firm, a terrace or a garden.

Home office and teleworking saves commuting time, new models of computers are developed for work, but also the remote heating of houses and supporting medical treatment and old people by net doctors can be an advantage. For conferences and meetings nobody needs to travel from town to town. Home office, home schooling, and medication per computer will solve individual problems. Preventing loneliness or ensuring mutual understanding and the joint solution of sophisticated tasks will however require a minimum of direct contacts. It should be part of a broadly defined, forward-looking industrial policy steered by education.

Globalization continues but is changing. The worldwide division of labor and resourcing will be different after the Covid pandemic. The advantage to have alternative suppliers in vertical sourcing has become evident, even if this may increase costs in "normal times". Rare materials

are clustered in some regions, and this leads to new monopolies and leverages, unlike those created by skills or economies of scope. Some countries are restrictive in exporting essential materials for electrical devices such as chips for laptops, computers, and electric cars. In general, supply constraints become more important relative to demand. Transport costs have to rise due to climate goals; and new trade barriers can also stem from conflicts and political sanctions (Belarus, Ukraine, nuclear enrichment in Iran, etc.)

Corporate responsibility is now extended towards social and environmental conditions and human rights in countries where inputs are sourced (chain responsibility) has to be reported if firms want to sell stocks or be qualified for an ESG portfolio). The diversification of sourcing becomes as important for production during crises as the diversification of demand and regional exports were before for stable profits. Responsible globalization and crisis-robust sourcing are goals which have started to change industrial policy.

Breakthrough technologies instead of sidesteps. Radically new technologies must be applied, if emissions have to be cut as quickly as needed by the Paris goals. This holds specifically for capital-intensive industries like steel, cement and pharmaceuticals, but also in the transport sector for ships and airplanes. Hydrogen may be a game changer, but it has to been green and not grey hydrogen. Energy consumption can decrease through higher energy and resource productivity. Greenhouse gases can be reduced by shifts from fossil to renewable energies, and methane can be reduced by changing nutrition from animals to fruits. If savings as well as shifts are supported by higher prices, this needs a complementary social policy as well as the learning of new capabilities and the generation of green jobs for the former employees of dirty industries. As usual, for any breakthrough technology there will be blockades created by incumbents, and by countries with a currently high share of fossil or nuclear energy.

Sidesteps must be prevented and dead ends are paramount; there is no question that gas is better than oil and coal, but it is nevertheless a fossil energy; agricultural subsidies reduce food shortages and poverty, but they support large farms and therefore boost pesticides and fertilizers; agriculture and nutrition cause methane emissions and catching-up economies and rising income lead to changes in consumption patterns. Deforestation is not reversed to the extent needed, and subsidies for fossil energies are still larger than those for clean energy or energy saving.

INDUSTRIAL POLICY FOR AN UNKNOWN FUTURE

In the previous section we reported challenges which are visible but not addressed adequately; this section speculates about the longer run, and how industrial policy would need to change if it should prepare for a future about which we know very little; a world under "severe uncertainty",[5] as labelled following Keynesian and Post Keynesian Economists (Aiginger 1987).
A new world order under Chinese lead. The rise of China to a superpower and the support of this path by industrial and innovation policy has been reported. China's goal is, however, to become the dominator in trade, investment, and important technologies, as well as in the finance of

[5] Some part of economic literature, specifically that developing mathematical model try to incorporate uncertainty with probability distributions. Keynesian economists object that Keynes defined uncertainty about the future as something changing behavior far more than can be grasped by probabilities. Aiginger tried to develop a dichotomization between severe and petty uncertainty, where the second can be included by probabilities, severe uncertainty changes behavior fundamentally.

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other countries and holding monopolies in rare materials, thus defining the country's future competitive edge.[6] Domestic and international reactions to a dominant superpower not controlled by democracy at home leads to uncertainty. Maintaining public ownership or extending territory to neighbors claiming autonomy (like Hong Kong or Taiwan), as well as building artificial islands to extend territory, is more than past superpowers had dared to do, and it will lead to unpredictable reactions hopefully without big wars. Middle powers like India or the South American players, the Middle East and Africa will build alliances, and the US or Russia will have to react. Industrial policy is not at the center of strategic reactions, but it influences the strength of the old and new players. No coalitions or alliances will come up. The influence of countries and blocks will have an impact on investment compacts, the financial system, and international organizations.

Chinese ambitions will be limited by the rising debt of its real estate sector, and regional conflicts, including those with the Uighurs, along with a declining population will limit China's quest to become the sole remaining superpower.

Preference changes and healthy life expectation can differ. The hierarchy of wants is discussed in consumption theory and development economics. After reducing poverty worldwide ,as demonstrated by reaching the millennium goals, preferences are shifting. Many people in rich countries often earn more by bequest than they can earn by working during a lifetime. Preferences between the older and younger generations are diverging, with having a good life and giving back to society what we got ("owe to each other" Shafik 2021) on rise. Education has to prepare for diversity and change (Colcuc 2021). Millennials want to have a full and long life in good health.

Life expectancy increases by three months for every decade a person is born later. But this does not hold for all countries and groups. Life expectancy differs between rich and poor people, it depends on nutrition and behavior and society. It is decreasing in the US due to obesity and opioids, where it is now lower than in Europe (Sachs 2021). Early death due to climate change (heat) is on the rise, again more for the poor and disadvantaged. Accidents due to heavy work in firms, industry or traffic have declined.

The youngest and largest population will be in Africa This continent – nearest to Europe – is a latecomer in taking up the higher growth rates in the developing world, due to political conflicts and HIV. Many Sub-Saharan countries have not yet experienced industrial take-off. Some appeared happy to possess material resources, but this raised wages and limited the success of more sophisticated industries. For most countries, industrial policy cannot be developed in the way it was for Bangladesh (Gelb et al 2020), since wages are too high; this is the case if mineral resources are available, or tourism increases currency reserves and in consequence exchange rates. Inequality of genders can exist with respect to wages, education and participation on the formal labor market. Gender inequality can – against the predictions of standard growth theory – in some countries support growth (Yildirim Metz 2021). After initially using low wages for

[6] Wawra (2021) reports four main ways in which China wants to dominate: military modernization, economic transformation, political power in international organizations, and ideological reach, to which one can add internal blockades from demography to regional conflicts.

industrialization and then reducing inequality of gender, due to policy change or through special zones, can lead to long-term growth.

Africa needs another industrial policy and a different one across countries; this will change industrial policy in Europe as well as the quest for resources by China.

Rules and extent of migration. If one neighbor experiences low birth rates and its younger generation wants to work in richer countries and the other has a young population which cannot be offered peace, education and jobs, migration looks to be the solution. As far as outward migration from Africa is concerned, several developments in the past decades had advantages. People leaving countries where they were discriminated or killed are now acknowledged as refugees (according to human rights). The economic motive to increase incomes by emigrating is now accepted, at least if the country of destiny needs more employees (including qualified ones according to blue cards systems).

But some trends cannot be extended: the population in Africa will double or triple in the next decades, by far surpassing the population of China. Africa already has the youngest population and the difference in the medium age to Europe, the US and China is on the rise. Europe is ageing and in several eastern and southern European countries the absolute number of people between the ages of 20 and 30 will halve up to 2050. This opens the doors for inward migration, which however is often opposed by citizens and limited by differences in skills, at least those accepted by the country of destiny. Revolving migration (people coming for some time and then returning with upgraded knowledge and contacts to Europe) would be a solution. But more is needed, such as a shift of investments of labor-intensive firms from Europe to Africa and more business startups in Eastern European countries. At the same time, education and gender equality would limit pregnancies. Offering education to the neighbors could be a European USP.

New role of Europe as a soft leader and green innovator. Europe is not frequently mentioned as a center of the upcoming world order, due to its split into individual nations, so that France or Germany are mentioned. If we take the EU27 or EU28 or add Switzerland and Norway, along with countries in the accession process in the Western Balkans, Europe today has the largest GDP in nominal terms, and it is the export champion in the world and net investor in many countries. This positive assessment can be extended and deepened if we calculate the data for a geographical Europe, including European successor countries to the Soviet Republic. If we finally define a "Wider Europe" including the MENA countries, or those parts of Africa next to the Mediterranean Sea, Europe remains the largest area for a longer time.

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Table 4 The relative size of "Europe"

	Real GDP					
	2000	2010	2020	2000	2010	2020
	USD bn			Percentage shares		
EU-27	**12,508.6**	**14,564.3**	**17,126.4**	**27.7**	**22.0**	**17.7**
UK	2,119.8	2,484.0	2,628.7	4.7	3.7	2.7
EFTA	877.3	1,045.4	1,198.2	1.9	1.6	1.2
West Balkans	54.0	84.1	99.0	0.1	0.1	0.1
Geographic Europe	**15,559.8**	**18,177.8**	**21,052.3**	**34.5**	**27.4**	**21.7**
Black Sea Region	641.6	994.0	1,509.7	1.4	1.5	1.6
CIS	339.4	1,987.2	1,885.6	0.8	3.0	1.9
Russia	278.3	1,633.1	1,473.6	0.6	2.5	1.5
Wider Europe	**16,540.8**	**21,159.0**	**24,447.6**	**36.7**	**31.9**	**25.2**
Middle East and North Africa	1,020.5	2,313.0	2,801.5	2.3	3.5	2.9
Sub-Sahara Africa	482.3	945.8	1,486.7	1.1	1.4	1.5
European Neighborhood (ENB)	1,502.8	3,258.7	4,288.2	3.3	4.9	4.4
Wider Europe and ENB	**18,043.6**	**24,417.7**	**28,735.8**	**40.0**	**36.9**	**29.7**
USA	**12,620.3**	**14,992.1**	**17,706.0**	**28.0**	**22.6**	**18.3**
China	**2,212.1**	**6,033.8**	**11,653.3**	**4.9**	**9.1**	**12.0**
World	45,127.6	66,241.0	96,855.5	100.0	100.0	100.0

Note: Geographic Europe - EU-27, EFTA, Western Balkans; Wider Europe - Geographic Europe, Black Sea Region, CIS; Wider Europe and ENB - Wider Europe, Middle East and North Africa, Sub-Sahara Africa
Source: IMF

Europe enjoys a high and rising life expectancy, free trade, the four Freedoms, and a European Court controlling the rule of law and division of power between parliament, the judiciary and government. Europe's growth rate is lower than that of the US (and far lower than that of China) , but it has a sophisticated industrial sector and leads in energy efficiency, as well as in the share of renewable energy. Most countries offer good vocational training, research expenditures are rising, and Europe is reducing greenhouse gases from a level far lower than that of the US. It has the potential to become a leader in green technologies; this is supported by the European Green Deal and the recovery programs. The recently started "European Gateway" should support European investments in Africa as an alternative to the Chinese Belt and Road initiative (European Commission 2010, 2011, 2012, 2020).

Venturing a speculative look into the unknown brings us back to the central role of a systemic industrial and innovation policy, which had been defined by Aiginger and Rodrik (2020) as a process in an unknown territory – and let us add, "under severe uncertainty". Many of the principles carved out in that paper are needed for the challenges that are already visible and even more so for those on the horizon in a world with Chinese dominance. They show that a narrowly defined industrial policy will not work.

SUMMARY: FROM TEN PRINCIPLES TO A NEW HORIZON

Industrial policy has to be driven by societal goals, where the SDGs offer a better compass than GDP or GNI. It will be different between countries due to preferences, but also according to

income level. It should never stick to the past but look for the high road and future welfare. Political leaders must be at the steering wheel, but citizens, outsiders, and young people also have to be on board. Past industrial policy has been dominated by incumbents, lobbies, and old boys' networks. Future industrial policy should not be a stand-alone policy, but has to maximize synergies with other policy lines, most notably innovation policy.

Countries can learn from the successes of past policy approaches but should not try to copy other countries. Africa, as the region with the youngest and a fast-growing population, has totally different climate conditions compared to the successful Nordic European countries. It must develop other breakthrough technologies than those of the big industrial regions in Europe or the US. No country can solve problems better alone or through "my country first" slogans; they all require positive spillovers from neighbors. Industrial policy must be shaped by societal conditions and will also shape increasing welfare.

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References

Aghion, Ph., Boulanger, J., & Cohen, E. (2014). Rethinking Industrial Policy. *Bruegel Policy Brief*, 04.

Aiginger, K. (1987). *Production and Decision Theory under Uncertainty*. Basil Blackwell.

Aiginger, K. (2007). Industrial Policy: A Dying Breed or A Re-emerging Phoenix. *Journal of Industry, Competition and Trade*, 3(4), 297-323. DOI:10.1007/S10842-007-0025-7

Aiginger, K. (2015). Industrial Policy for a sustainable growth path. In Bailey, D., Cowling, K., & Tomlinson, P*. New Perspectives on Industrial Policy*. Oxford University Press.

Aiginger, K. (2016). *New Dynamics for Europe: Reaping the Benefits of Socio-ecological Transition. Part I: Synthesis, WWWforEurope Synthesis Report, Final Version*. Vienna, Brussels.

Aiginger, K., & Colcuc, A .(2021). Climate Policy Goes Mainstream A New Priority Distinct from Laissez-faire, Which Supports Welfare and Equity. *Research in Economics and Management,* 6(4). https://doi.org/10.22158/rem.v6n4p20

Aiginger, K., & Rodrik, R. (2020). Rebirth of Industrial Policy and an Agenda for the Twenty-First Century. *Journal of Industry, Competition and Trade*, 2, 189-207. https://doi.org/10.1007/s10842-019-00322-3

Aiginger, K., Bärenthaler-Sieber, S., & Vogel, J. (2013). Competitiveness under New Perspectives. *WWWforEurope Working Paper,* 44. http://dx.doi.org/10.13140/RG.2.1.1003.1525

Aiginger, K. (2013). The Greening of Industrial Policy, Headwinds and a possible Symbiosis. *WIFO Working Papers*, 450.

Aiginger, K., & Sieber, S. (2006). The Matrix Approach to Industrial Policy*, International Review of Applied Economics*, 20(5), 573-603. DOI: 10.1080/02692170601005507

Andreoni, A., & Chang, H.J. (2019). The political economy of Industrial Policy. *Structural Change and Economic Dynamics*, 48, 136-150. DOI: 10.1016/j.strueco.2018.10.007

Atkinson, R.D. (2021). *Why America needs a Competitiveness Council.* December 13. https://itif.org/publications/2021/12/13/why-america-needs-national-competitiveness-council

Bock-Schappelwein, J. (2016). Digitalisierung und Arbeit. In Peneder, M. (Koordination), Bock-Schappelwein, J., Firgo, M., Fritz, O., & Streicher, G. *Österreich im Wandel der Digitalisierung*. Studie des WIFO im Auftrag von A1 Telekom Austria AG.

Curzon Price V (1981) Industrial Policies in the European Community. Springer Verlag GmbH.

Colcuc, A. (2021). *Reduktion der Armut in Industrieländern: Theorie, Instrumente, Erfolge*. Bachelor Thesis, Business University of Vienna.

European Commission. (1990). *Industrial policy in an open and competitive environment: Guidelines for a community approach*. COM(1990) 556. https://op.europa.eu/s/vkpC

European Commission. (2002). *Industrial policy in an enlarged Europe*. COM(2002) 714. https://ec.europa.eu/invest-in-research/pdf/download_en/industrial_policy_enlarged_europe.pdf

European Commission. (2004). *Fostering structural change: An industrial policy for an enlarged Europe*. COM(2004) 274. https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2004:0274:FIN:en:PDF

European Commission. (2005). Integrated guidelines or growth and jobs. COM(2005) 141 final. https://ec.europa.eu/economy_finance/publications/pages/publication6410_en.pdf

European Commission. (2007). *Mid-term review of industrial policy, A contribution to the EU's Growth and Jobs Strategy*. COM(2007) 374 final. https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0374:FIN:en:PDF

European Commission. (2010). *An Integrated Industrial Policy for the Globalisation Era Putting Competitiveness and Sustainability at Centre Stage*. COM(2010) 614 final. https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0614:FIN:EN:PDF

European Commission. (2011). *A resource-efficient Europe – Flagship initiative under the Europe 2020 Strategy, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions.* COM(2011) 21 final. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0021:FIN:EN:PDF

European Commission. (2012). *A Stronger European Industry for Growth and Economic Recovery, Industrial Policy Communication Update*. COM(2012) 582 final. https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2012:0582:FIN:EN:PDF

European Commission. (2020). *Making Europe´s business future ready*. March 10. https://europeansting.com/2020/03/10/making-europes-businesses-future-ready-a-new-industrial-strategy-for-a-globally-competitive-green-and-digital-europe/

Gelb, A., Ramachandran, V., Meyer, C.J., Wadhwa, D., & Navis, K. (2020). Can Sub-Saharan Africa Be a Manufacturing Destination? *Journal of Industry, Competition and Trade*, 20, 335–357. https://doi.org/10.1007/s10842-019-00331-2

Krugman, P., & Obstfeld, M. (1991). *International Economics Theory and Policy*. New York, Harper Collins.

Peneder, M. (2017). Competitiveness and Industrial Policy: From Rationalities of Failure Towards the Ability to Evolve. *Cambridge Journal of Economics,* 41(3), 829–858.

Rodrik, D. (2004). Industrial Policy for the Twenty- First Century. *CEPR Discussion Paper*, 4767.

Rodrik, D. (2014). Green Industrial Policy. *Oxford Review of Economic Policy*, (30)3, 469-491. https://doi.org/10.1093/oxrep/gru025

Rodrik, D., & Sabel. C. (2019). Building a Good Jobs Economy*. Harvard Kennedy School Faculty Research Working Paper,* RWP20-001.

Sachs, J. (2021). *America's Struggle at Home*. Project Syndicate, December 4. https://www.project-syndicate.org/onpoint/america-struggling-at-home-to-reverse-decades-neglect-by-jeffrey-d-sachs-2021-12?barrier=accesspaylog

Saggi, K., & Pack, H. (2006). Is There a Case for Industrial Policy? A Critical Survey. *The World Bank Research Observer,* 21(2). https://doi.org/10.1093/wbro/lkl001

Shafik, M. (2021). *What we owe each other, A New Social Contract*. The Bodley Head, London.

Tagliapietra, S., &Veugelers, R. (2021). Fostering the Industrial Component of the European Green Deal: Key Principles and Policy Options*. Intereconomics*, (56)6, 305-310.

Wawra, J. (2021). *China´s Long Run Objectives, Challenges and Drivers*. Master Thesis, Business University of Vienna.

Yildirim Metz, H. (2021). *The Inequality Paradox: The ambivalent Role of Gender Inequality in Developing countries*. Master Thesis, Business University of Vienna.

URL: http://dx.doi.org/10.14738/abr.103.11682