



NEW SUSTAINABLE ECONOMICS

Global discussion paper



2022



“The turning point in economics is similar to the great paradigm shifts in natural sciences”

GERGELY BAKSAY



“Catching up processes driven by new visions can only be organised around the idea of sustainability.”

GYÖRGY MATOLCSY



“We need to find new drivers for growth, new technologies for sustainability and new forms of financing.”

BARNABÁS VIRÁG

**NEW
SUSTAINABLE
ECONOMICS**

Global discussion paper

NEW SUSTAINABLE ECONOMICS
Global discussion paper

Books series of the Magyar Nemzeti Bank
© Magyar Nemzeti Bank, 2022

Editors:
Gergely Baksay, György Matolcsy, Barnabás Virág

The authors would like to thank György Matolcsy, governor of the central bank as well as Csaba Kandrács, Mihály Patai and Barnabás Virág, deputy governors of the central bank for their advice during the preparation of the book.

Published by: Magyar Nemzeti Bank
1013 Budapest, Krisztina körút 55.
www.mnb.hu

All rights reserved!

Cover photo: shutterstock
Graphics: Anita Nemes
Printed by Copy & Consulting Kft.

ISBN 978-615-5318-51-1

NEW SUSTAINABLE ECONOMICS

Global discussion paper



2022

Gergely Baksay: Foreword 6

1. GYÖRGY MATOLCSY:
NEW SUSTAINABLE ECONOMICS (Theses) 9

I SUSTAINABILITY: THE FOUNDATION OF 21ST CENTURY ECONOMICS

2. Balázs Vonnák:
Limits to the sustainability of economic growth 21
3. Kristóf Lehmann:
Only change is permanent
Economics on the brink of another change 31
4. Zoltán Szalai:
We are entering a new technological era 41
5. Balázs István Horváth, Norbert Kiss M., Pál Péter Kolozsi:
Multidisciplinarity and economics
What can economists learn from other disciplines? 51

II THE NEW ECONOMY IS BASED ON NEW RESOURCES

6. Péter Hugó Asztalos:
Knowledge
Talent and creativity are the true sources
of economic growth 61
7. Tímea Várnai:
The relationship between capital and economic growth
shifting the focus from quantity to quality 71
8. Ádám Martonosi:
Technology
The law of increasing returns may become reality 81
9. András Balogh, Réka Margit Hamvai, Gábor Horváth,
Ádám Nyikes, Gergő Török:
Money
Central bank digital currencies change access to money 91
10. Bálint Dancsik, Áron Drabancz, Márton El-Meouch Nedim,
Koppány Nagy, Richárd Bense, László Török, András G. Szabó:
New and sustainable forms of financing the economy
Advantages and dilemmas 103
11. Katalin Juhász:
The necessity of a green turnaround in theory and practice
Our past, present and future resources 113
12. Gábor Izsák, Alexandr Palicz, Katinka Szász, Balázs Varga:
Data
The new oil, the latest factor of production 123
13. Dániel Babos:
Trust
A precondition for complexity and networking 133

III HOW “VALUE” IS CREATED IN THE 21ST CENTURY

14. Katalin Kis:
Creating economic value in the digital age
Value is based on knowledge, creativity and market gap 143
15. Bálint Danóczy – Péter Sajtos:
New forms of production and services
Access, circular and platform economy 153
16. Bence Tringer:
The new economy requires a reform of measurement 163

IV THE BALANCE OF MARKET AND STATE

17. Zoltán Bögöthy, Róbert Hausmann:
A new, green, sustainable tax system
Basic principles for family-friendly, digital, and
environmentally friendly modern taxation 173
18. Péter Gábrriel:
State and market synergies in delivering innovations 183
19. Dávid Papp, Balázs Sárvári, Márton Varga:
Sustainable finance
The new linkage between the financial system
and sustainability 193
20. Ferenc Tóth:
Income and wealth inequalities 203
21. Ágnes Horváth-Hajzer, Erika Csongrádi, Szilveszter Tordai:
Data protection and the regulation of network
monopolies 213

V UNDERLYING STRUCTURES OF THE ECONOMY

22. Emese Kreiszné-Hudák, Krisztina Zanaty,
Péter Hugó Asztalos:
The economic impact of demographic developments 221
23. György Kocziszky:
Values and culture behind sustainable
economic growth 231
24. Norbert Csizmadia:
Geofusion, spatial structure and geopolitics 241

FOREWORD

Gergely Baksay

The basic thesis of this discussion paper is that there is a need for a sustainability turnaround in all aspects of life in our world, and that should be reflected in economics as well. What's more, without a fundamental transformation of economic thinking, the sustainability turnaround cannot be attained.

Now is the time to completely overhaul economics, because the challenges of the 21st century cannot be addressed with the ideas and tools of the 20th century. The most significant one of the new challenges is global warming and the depletion of our environmental resources. But we also need to find new drivers for growth, new technologies for sustainability and new forms of financing. The challenges are therefore more complex than ever before, and economics can only provide a valid response if it takes a holistic approach and includes the results of other disciplines to broaden its tools. Uncertainty, the observer effect or the multiple nature of money can be understood by applying the methods of quantum physics, but the application of geography, history, biology, psychology, linguistics and network science is also needed.

The economics of sustainability needs to put the study of resources on a new footing and extend its analysis to knowledge, data, energy and money. Connectivity changes the units of analysis. The new economics looks at networks in addition to individuals, and platforms in addition to individual decision-makers.

We must recognise that human knowledge and talent are now at the heart of our economic development, above all other factors. It is knowledge and talent that become tangible in capital and technology (4T). It is human talent, diligence and character that we need to nurture and strengthen as our most important asset.

At the same time, digitalisation has created a new resource, data, which, like knowledge, grows rather than diminishes as it is used. Digitalisation is renewing measurement, while the data it creates will become the most important object of measurement. Data is the first resource that is evenly distributed around the world. The winner of the future will be the one who can best use the new raw material.

The changes in technology also bring with them a revolution in money. We need to understand the new nature of money, because digital currencies blur the distinction between money and data, and even between money and energy. Digital money gives central banks an unprecedented opportunity to play an even greater role in the economy.

We only have a future if we take environmental sustainability into account in the background of all our decisions. The new economics must serve life and its sustainability.

The power relations of the new century can only be understood through the broad toolbox of geopolitics. The century of Eurasia is ahead of us. Following the path of demography and talent, the centre of the world economy is shifting further to the east. The world will go from unipolar to bipolar and will consist of global networks based on regionalisation rather than hyperglobalisation.

The turning point in economics is similar to the major paradigm shifts in natural sciences. Just as the shift from geocentrism to heliocentrism has moved the centre of our world to a more distant point, so too must the approach of economics turn towards sustainability. Mainstream economics has previously largely avoided all the issues that are at the heart of sustainable economics. Looking at the last 10 years of the 5 largest journals, climate change was covered only in 0.25 per cent of studies, inequality in less than 1 per cent, and digital money was virtually absent from these studies.

As practice follows theory, there is no time to delay a change in our approach. This book is based on an essay by György Matolcsy, the governor of the Magyar Nemzeti Bank, and it sets out the key principles of the new sustainable economics. The fundamental insights of the new economics are already with us, and it is the great task of this generation to unfold them.

GYÖRGY MATOLCSY

NEW
SUSTAINABLE
ECONOMICS
(Theses)

*Civilisation needs
a turning point in sustainability,
in order to survive.*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



Why do we not recognize that a sound economic theory is needed in order for Hungary to achieve sustainable economic convergence, given that the earlier foundations have changed? The classical, neoclassical, liberal, social market and other economic theories of the past are no longer valid. They are being replaced with a new, emerging theory. This is the theory of long-term sustainable economics. As we move forward, we learn new laws. Who else but us, unorthodox economists, would be thinking about this, and when, if not now, in the midst of a convergence process that promises success?

In the form of a logical outline, this essay examines 36 new contexts upon which a new sustainable economy can be built. Let us begin by looking at the leading theorems of today's intellectual revival, comparable to the intellectual revolutions of the Renaissance and Reformation some 500 years ago.

1. Material wealth is based on an intellectual resource: knowledge.

When transmitted, knowledge becomes information, and, when shaped to be uniform, it becomes data. Data is the new oil, talent is the new capital, and creativity is the new soil.

2. Knowledge expands exponentially when it is transferred.

Material goods are consumed as they are used, and money and capital may increase or decrease linearly as they are used. Knowledge is the first economic resource that expands exponentially as it is shared, i.e. consumed.

3. Talent and creativity are becoming crucial resources.

Knowledge grows through learning, work and diligence, and it is radically accelerated by talent and creativity. The latter are now limited resources and therefore become a bottleneck.

4. The exponential growth of knowledge creates a general abundance.

The scarcity of material goods is being replaced by abundance, because the expansion of knowledge is constantly creating new technological revolutions that generate abundance.

5. The breakthrough came with the new technology of knowledge-sharing.

The internet entered our daily lives at the end of the last millennium, followed by other tools of the communications revolution, which together are triggering new technological revolutions.

6. The knowledge revolution will eventually come up against material limits.

The exponential growth of knowledge creates a general abundance, which at some point clashes with natural and social constraints. Humanity has reached this point.

7. Civilisation needs a sustainability turnaround in order to survive.

Knowledge is expanding exponentially at all times and in all directions, which is why it encounters natural and community boundaries. For the human community to survive, new technologies must be channelled into sustainable directions. This is the essence of the 21st century.

8. The sustainability turnaround starts with a revolution in thinking.

As the economy is the crucial arena for new technological revolutions, it is here that knowledge first encounters material constraints. This is why we have reached a turning point in economic thought.

9. The revolution in thought is based on two principles: sustainability and the principle of life.

The principle of sustainability is the principle of equilibrium growth, and its formula is E+G. The principle of life accepts that all economic and social organisations are living, and therefore operate according to the principle of “greatest impact”, as opposed to the principle of “least impact” in the inanimate world.

10. The new economy is built on the primacy of the public interest.

Each economic and social community takes its own path, but they must follow the laws of sustainable economics. The focus is no longer on capital and profit, but on the public interest, that is sustainability and the respect of life.

11. Access comes before ownership.

Today, talent and creativity are the bottlenecks, which means that access to life’s basic goods is becoming more important than property for every individual, family and community. The basic goods are the common knowledge of humanity and the means to expand that knowledge (work, home, quality education and health care). With access to these, talent and creativity can flourish.

12. The principle of increasing returns replaces the principle of diminishing returns.

Exponentially expanding knowledge and technological revolutions are replacing the principle of diminishing returns. Knowledge, an unconstrained resource, is now the premier resource, while today's constrained resources, talent and creativity, are the bottlenecks; thus, increasing returns appear everywhere in human activities.

13. The conceptual revolution of sustainability builds on the principle of increasing returns.

This occurs in two ways. On the one hand, it drives research and investment towards sustainable technological breakthroughs in the public interest. On the other hand, it expects that increasing returns generate higher risks, especially in the area of nature/human and individual/community relations. Both methods reinforce the idea of sustainability and then the turnaround.

14. Together, sustainability and the principle of life cause a non-linear revolution in thought.

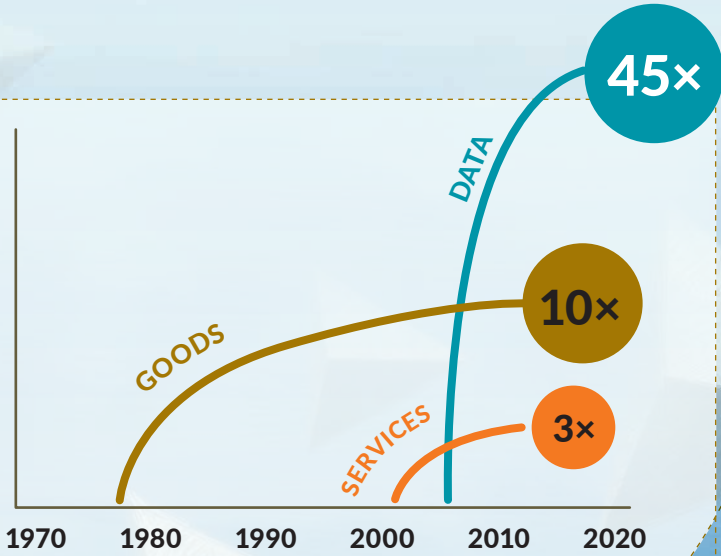
The exponential increase in knowledge triggers non-linear processes that we are already seeing in the field of environmental damage and social problems. With asymmetrical trajectories and multiple butterfly effects, more and more cause-and-effect relationships that cannot be precisely identified occur; therefore, the renewal of thought is not linear but exponential, and new creative trajectories are created.

15. The revolution in thought is a “mission”.

The exponentially spreading changes do not allow for the neutral technical approaches of the past, as uncertainty and unpredictability in all areas of human activity are increasing. The thought revolution of our time (like the Renaissance and the Reformation earlier on) is like a “mission”, bringing emotions and feelings into the transformations of thought and then reality, thus intensifying and accelerating the paradigmatic shifts in thinking.

Figure 1.1: Changes in the turnover of goods, services and data

Source: Based on McKinsey (2014): *Global flows in a digital age: How trade, finance, people, and data connect the world economy* and McKinsey (2016): *Digital Globalization: The New Era of Global Flows*, MNB



16. The knowledge revolution creates a parallel reality.

The knowledge revolution is building a virtual world and a virtual business life alongside the existing world and today's functioning economy. The traditional world of producing goods is joined by a world of communication which has different rules of motion compared to the real world. Sustainable economics will also be dual, like the physics of large bodies and elementary particles in the world of physics.

17. The sustainability turnaround creates a new spatial structure.

The sustainability revolution in our thinking breaks with the previous concept of time, as the temporal diffusion of ever increasing masses of knowledge is accelerating and the growing energy of human knowledge bends the spatial structure of the modern economy. The value of shared spaces, such as homes, public spaces, spaces for community events, towns and city centres, is increasing. Alongside these, individual and family "recreational" spaces are also becoming more and more valuable: gardens, parks, forests, waters and mountains. The spatial structure is changing and becoming twofold, in order to share and expand knowledge.

18. Convergence driven by new visions must be organised around the idea of sustainability.

Successful examples from the past should be applied to the future. However, the successes of the past are not an accurate guide, because history, along with the laws of economics, have changed in terms of crucial aspects. It is worth following those who are already bringing their operations forward from the future and are building on the conceptual revolution of our time, including the laws of sustainable economics.

We need to realise that the key challenge of the new knowledge-based era is long-term sustainability, and the first steps in this direction are a revolution in thought and the resulting new sustainable economy.



Einstein's message is clear:

***“WE CANNOT SOLVE
OUR PROBLEMS WITH THE SAME
THINKING WE USED WHEN
WE CREATED THEM.”***

THUS, THE LOGICAL OUTLINE CONTINUES WITH THE 18 RELATIONS OF THE NEW ECONOMY.

19. Different areas of knowledge merge in the theory of sustainable economics.

The technological revolution of knowledge, information and data merges traditional economics with the world of other social sciences and then natural sciences, in particular quantum physics and biology.

20. As separate areas of the economy come full circle, the circular economy requires a new theory.

Consumption data become the raw material for production. The areas of consumption and investment merge, because the “consumption” of knowledge becomes an investment. The boundaries between industry and services are disappearing. In all production areas, circular chains are created for sustainability. This can only be described by a new theory.

21. The traditional relationships in economics are “getting flat”, fading or disappearing.

The new theory of the circular economy – complemented by other social and natural sciences – breaks down the old causal and linear relationships and replaces them with probabilities, uncertainty relations and trajectories with unusual geometries.

22. The set of factors in the new economy will be more diverse and larger in scale.

Long-term sustainability requires the analysis of essentially all social and economic data, so the number and types of factors addressed by economics shows a leap in scale.

23. The mathematics of pure numbers and the relationships of life sciences are both strengthened and united.

Mathematical economics returns to Pythagoras (pure mathematics) and is complemented by the Bauer principle (life principle). The theory of sustainability focuses on the formulas of the golden ratio, the golden spiral and sustainable growth.

24. The new economics redefines the global, regional and local economies.

The composition of global trade today is shifting away from material goods towards intellectual goods, while regional trade is expanding as a result of the circular economy. It is the local economy (family knowledge production, local businesses, national companies) that stands to gain most from the knowledge revolution, because knowledge is increasingly produced and consumed locally.

25. The new economics is deepening towards the past and accelerating into the future.

The fusion of economics with social and natural sciences brings about a two-pronged change in economic thinking. It reveals and transforms into data, and incorporates all of the knowledge of all previous civilisations that describes the functioning of society and the economy of the time. It looks for the interconnections of today's economy. In the meantime, it uses the laws of natural sciences to decipher the economic relationships of the future.

26. The new economics measures everything and transforms it into data.

As the new economic thinking is characterised by new contexts and new trajectories, it is necessary to be ready for change and self-correction at any moment. This requires all economic events to be measured and then converted into data, along with a constant review of previously recorded items. There is no longer an orthodox economics set in stone, only an ever-changing and therefore always unorthodox economics.

27. The new economics is also a networked and platform economics, like the economy and society.

The new economics is not based on eternal laws (such as the invisible hand, self-regulating markets, inflation and wage increases), but on rapidly changing knowledge networks and platforms. These are constantly producing new data, locally valid relationships, conjectures and contradictory theories.

28. Business merges with economics education.

In the digital transition, everything becomes data, accumulating in large databases and providing the basis for business decisions and economics education. All higher education – especially in economics – becomes dual, because the educational material and the business data form a unique, circular web.

29. Economic theory is also becoming culture-based.

As the exponentially expanding knowledge-based economy becomes culture-based, economics merges with culture. An economics organised around sustainability incorporates everything that is the cultural source of the economy and growth (patterns of thought, values, behaviour, community intellectual capital).

30. The new economics creates a new theory of prices.

In the new era of information, the real value and price of the economy's basic resources is heading towards zero. This will apply first to information, and then to money, energy and other material resources. This is due to the other technological breakthroughs made possible by the communications revolution (Industry 4.0, Society 5.0, the new agricultural revolution).

31. The new economics redefines complexity and simplicity.

The knowledge revolution increases the value of everything that incorporates more and more diverse knowledge into the production of goods. This valorises the density of connections (complexity) in the areas of circular production/consumption. At the same time, simplicity is becoming more valuable, as intermediaries are eliminated in more and more areas of life (online commerce, financial investments, online banking, learning).

32. Interoperability will be a fundamental law of the new economics.

As a result of the demand for and speed of knowledge diffusion, vertical organisations are transformed into networks, intermediaries are eliminated, and interpenetration between previously separate domains becomes pervasive. The new integrations between the financial system and the technology sector, the IT sector and the automotive industry, and higher education and the IT sector are already examples that the interoperability between capital and knowledge will be complete in the future economy.

33. The new economics needs new metrics.

As economic relationships are changing faster and faster, more and more varying factors must be measured. More and more areas and more and more changes have to be measured, because the links between them are also becoming faster. This will require new metrics in addition to and instead of those used today. The new compass is long-term sustainability, where both parts of equilibrium growth – equilibrium and growth – need to be measured more widely, more quickly and more reliably than today.

34. The sustainability compass increases the time horizon of economics.

The time span of measurements is shortening, because it is necessary to increase the volume, types, speed and manner of measurement. At the same time, the time horizon of the economic context is growing longer, as the long-term behaviour of more and more diverse factors has to be taken into account in the evolution of the trajectories and patterns that influence the future.

35. The role of the state is changing in the new economics.

Since its inception, the state has always been involved in the management of the economy, to varying degrees in different eras. Only states – individually and collectively – have the capacity to accelerate the transition to long-term sustainability. They can achieve this by working in two, mutually reinforcing ways: by accelerating the knowledge revolution and by steering the economy in a sustainable direction. The digital switchover and the green transition, education and health, families and communities, and the preservation and strengthening of public and cultural assets will be at the heart of public action.

36. Sustainable economics is the science of human relations.

So far, economics has been predominantly about the connections between humans and the world beyond humans. It analysed the links between the land and man, the means of production and man, and money/capital and man. The revolution of knowledge is connecting human communities, where it is no longer the connection between the living and inanimate worlds that is decisive, but rather human-to-human connections. Sustainability is about human civilisation, and thus human relationships are at the heart of sustainable economics.



*A new conceptual paradigm
is on the horizon, so let's take the advice
of anthropologist Gregory Bateson:*

***“YOU CAN'T HAVE A NEW IDEA
UNTIL YOU GET RID OF
AN OLD ONE.”***

A large, stylized letter 'I' is formed by a dashed line. The letter is positioned on the left side of the page, extending from the top to the bottom. A solid dark olive green horizontal bar is attached to the right side of the letter, containing a white serif letter 'I'.

I

**Sustainability:
the foundation
of 21st century
economics**

BALÁZS VONNÁK

LIMITS TO THE SUSTAINABILITY OF ECONOMIC GROWTH

*“Convergence driven by
new visions must be
organised around the idea
of sustainability.”*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



The rapid growth characterising the developed countries in the second half of the last century slowed down in the early 2000s (*Figure 2.1*). The reason for this slowdown is that the old growth model is becoming increasingly unsustainable. **In this chapter, we outline the key factors and trends that enabled the recent rapid growth, but which may now pose limits to long-term economic growth in the coming decades, both at the global and local levels,** and therefore represent economic, environmental and social policy challenges for decision-makers. First, we summarise what we know about the negative impacts of climate change and where we are most uncertain. The main **demographic** megatrends are then presented, with a particular focus on how they affect the potential growth opportunities for economies. Finally, we look at the relationship between **indebtedness** and economic growth.

NATURE IS NOT ONLY BEAUTIFUL, BUT ALSO A SOURCE OF WEALTH

Since the industrial revolution, Western civilisation has viewed the natural environment as a resource that can and should be exploited to increase prosperity. In many ways, however, using up the Earth's natural resources is not a desirable process. On the one hand, in addition to consumption, a liveable environment also makes a significant contribution to quality of life. On the other hand, global environmental degradation is triggering ecological and climatic developments that will limit economic growth opportunities in the long term, causing significant damage to future generations. We also have a moral duty to preserve the planet for future generations.

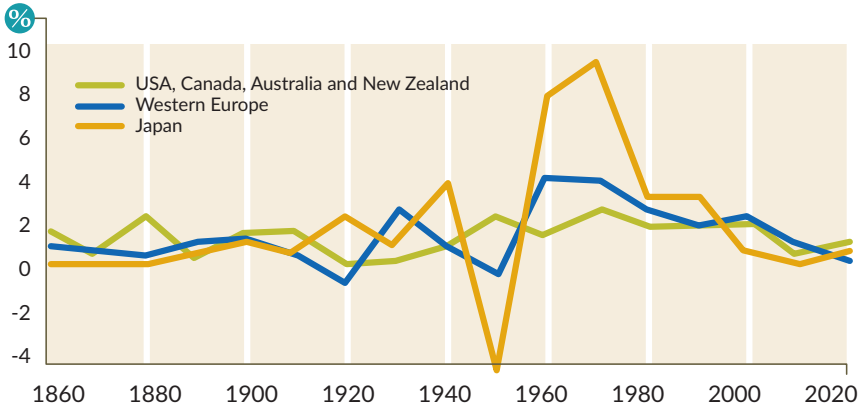
From the perspective of the environmental sustainability of economic growth, greenhouse gas (GHG) emissions and their impact on climate change are the greatest challenge of our time (*Figure 2.2, right pane*). Higher-than-natural concentrations of these gases cause the average temperature of the Earth to rise, changing the climate of our planet. The reduction in arable land and water supply problems will lead to a decline in agricultural production. The increasingly frequent natural disasters and rising ocean levels threaten both inhabited areas and production capacities.

Figure 2.1: Real GDP growth rates in developed regions

Source: Own calculations based on the Maddison Project Database 2020

Note: Average annualised growth rates per decade.

The last observation is the average between 2010 and 2018.



***THE GROWTH PATTERN
OF THE SECOND HALF OF
THE LAST CENTURY
CANNOT BE SUSTAINED.***

All of these factors are expected to lead to a slowdown in economic growth and significant income losses in the coming decades. **According to the latest research, if the current global warming trajectory continues, the average temperature of the Earth will rise by an additional 2 to 2.6°C by the middle of the century, which could leave global GDP 10 per cent lower than the level it would reach at current average temperatures** (Swiss Re, 2021). However, the expected rate of warming is uncertain. In a worst-case scenario, it could exceed 3°C, which would represent a loss of 14 per cent of GDP.

Although the economics of climate change has made significant progress in recent decades (e.g. Nordhaus, 1993), the reliability of the models used to estimate impacts is still controversial. This is because they attempt to capture unprecedented, highly complex processes and relationships, and there is thus a significant risk that the negative economic (and social) impacts are much greater than what the models predict.

GHG concentrations have already reached levels not seen for hundreds of thousands of years (*Figure 2.2, left pane*). As a consequence, it is difficult to predict which climatic processes will be triggered by further increases in average temperatures. Furthermore, there is no experience on how and to what extent economic activities are affected by climate change. The social, geopolitical and migration impacts of climate change are also unpredictable. In light of this, estimates based on historical relationships can be misleading, and real risks are skewed in the negative direction compared to model-based calculations.

Adverse climate impacts can be mitigated or even completely eliminated by reducing GHG emissions, but this would entail significant economic and welfare costs with current technologies. **The sustainability problem of economic growth is therefore an intergenerational distributional issue: in order to ensure that climate change does not reduce the well-being of future generations, our generation must take action.**



IPCC INTERACTIVE
ATLAS ON WARMING

Figure 2.2: Global atmospheric carbon dioxide concentrations from 800,000 BC (left pane) and 1500 AD (right pane) to the present

Source: <https://ourworldindata.org/atmospheric-concentrations>

Note: ppm (parts per million): the number of carbon dioxide molecules per million atmospheric particles.

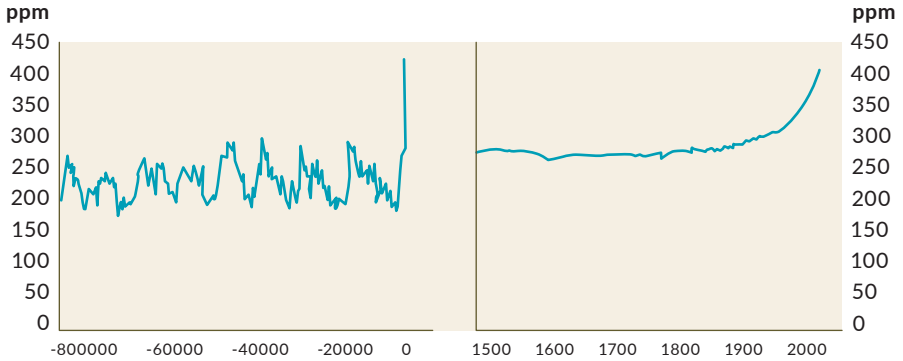
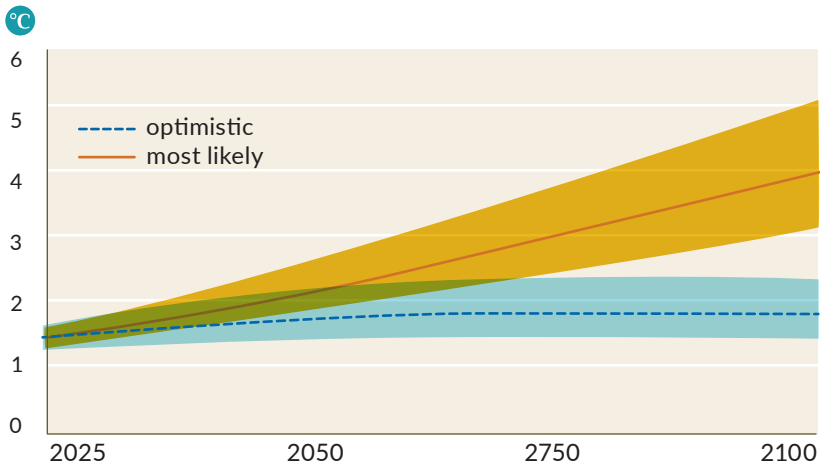


Figure 2.3: Global average temperature projections based on current trends (“likely”) and along an optimistic path

Source: The Intergovernmental Panel on Climate Change, Working Group II Sixth Assessment Report <https://www.ipcc.ch/data/>

Note: Deviation from the average temperature between 1850 and 1900.



DECLINING AND AGEING POPULATIONS IN THE DEVELOPED COUNTRIES

Demographic trends affect the long-term economic performance of a country in many ways. **One of the biggest challenges of our time in the developed countries (and in parts of the developing world in the near future) is the ageing of societies**, as a consequence of low fertility rates and high life expectancy. In an ageing society, fewer and fewer young people support more and more inactive citizens, leading to a decline in per capita income.

The most important global demographic trends in recent decades have been the rise in life expectancy at birth and, in large part as a consequence of this, the rapid expansion of the population. Life expectancy is projected to rise from 73 years today to 82 years by the end of the century, while the gap between the developed and developing worlds will continue to narrow.

Population change is shaped not only by life expectancy but also by the number of births. The fertility rate in developed countries has long been low and currently stands at 1.7. The indicator has also fallen significantly in Asia, which used to account for a large share of global population growth, dropping to 2.2. For this reason, although the world's population is expected to continue to grow in the coming decades (nearly 11 billion inhabitants by 2100), the increase will mainly come from Africa, where fertility rates are still high (4.7). In Asia, a decline is expected already from the middle of the century (*Figure 2.4*).

While population growth mainly only affects total output, the age structure of the population plays a more important role in the evolution of GDP per capita, which is a more important indicator for productivity, competitiveness and welfare. One important indicator of the age structure is the dependency ratio, that is the ratio of dependants to earners. When this ratio is high in a given economy, there are more inactive persons per employee, which means less output per person.

Dependency ratios in developed countries are expected to rise from the current level of 50 per cent to close to 80 per cent by the end of the century (*Figure 2.5*). The decline in the percentage of the working age population is expected to slow the growth of per capita income (Bloom and Canning, 2008). This drag will be most pronounced in the advanced economies, but will not spare the Asian economies either, which have recorded dynamic growth in recent times.



SHORT UNITED NATIONS FILM ON
THE CHANGING AGE STRUCTURE
AND SUSTAINABLE DEVELOPMENT

Figure 2.4: Population by continent

Source: UN, World Population Prospects 2019

Note: Post-2020 forecast.

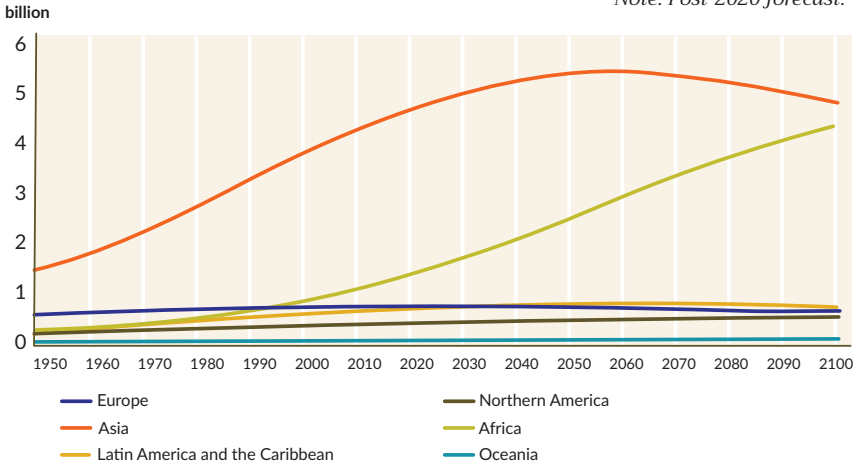
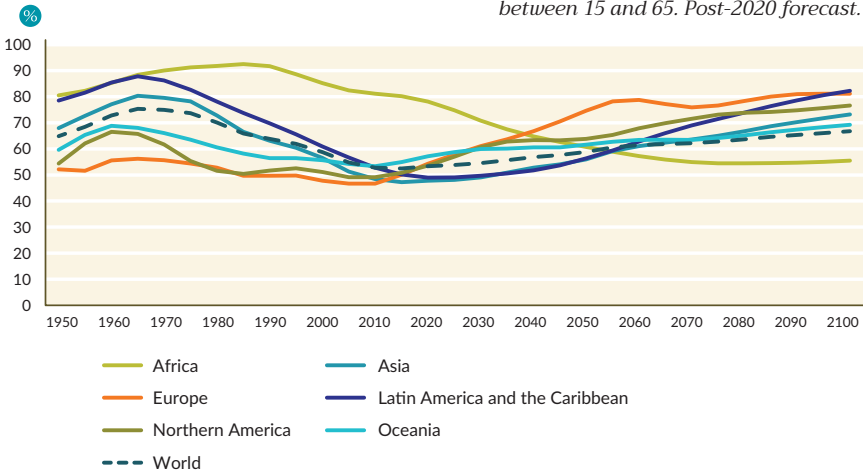


Figure 2.5: Evolution of the dependency ratio

Source: UN, World Population Prospects 2019

Note: Population aged under 15 and over 65 divided by the population aged between 15 and 65. Post-2020 forecast.



THE DRAG OF DEBT

The financial crisis of 2007–2008 once again underlined the fact – which has been highlighted from time to time in history, but is always forgotten – that the growth model of excessive debt accumulation is risky and unsustainable.

Indebtedness can be justified in certain periods and situations and can help to achieve a steady growth or consumption path. In the case of underdeveloped economies or start-ups with significant growth potential, debt-financed capital accumulation can pay off if the additional income generated by the investments covers the debt service burden. The same is true for people at the beginning of their careers, who can, for example, use loans to finance investments in their human capital (studies) or to start a family.

Government indebtedness can also be justified during recessions caused by adverse external shocks, as at such times jobs and viable businesses are saved to preserve long-term growth potential. However, it is important that the new loans should always finance productive investments or maintain productive capacity that is useful in the long term.

In open and catching-up economies, capital accumulation is often associated with external indebtedness, which can act as a constraint on long-term growth via several channels. On the one hand, the expected future debt service burden and the uncertainty surrounding its exact size may lead economic agents to postpone their investments. On the other hand, lenders may demand a higher risk premium in bad economic times, fearing the risk of default.

At the global level, there is no sign that the financial crisis has reversed the debt cycle. While indebted actors in the countries most affected by the crisis have been engaged in prolonged balance sheet adjustments, many previously less indebted developing countries have seen dynamic credit growth. However, debt growth is also the prevailing trend in developed countries, which was made even more evident by the fiscal stimuli during the COVID crisis (Figure 2.6). Although the debt burden has generally not risen in line with the indebtedness due to persistently low interest rates, this could change significantly in the period ahead, and over-indebtedness could again become a serious problem.



CAUSES AND IMPACTS
OF THE 2008
FINANCIAL CRISIS

Figure 2.6: Government debt-to-GDP-ratio in OECD countries

Source: OECD

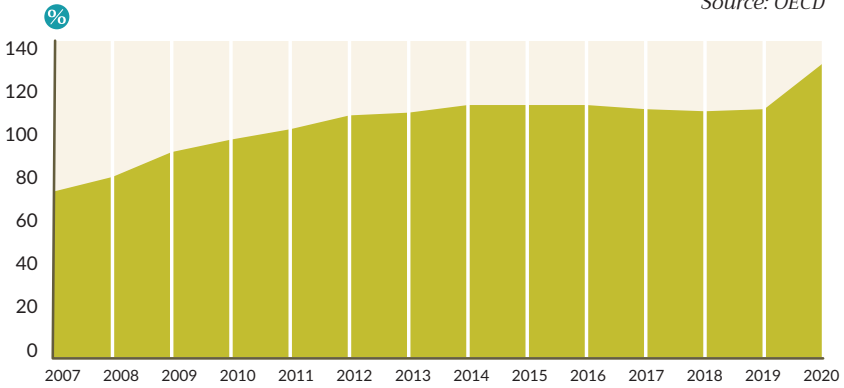
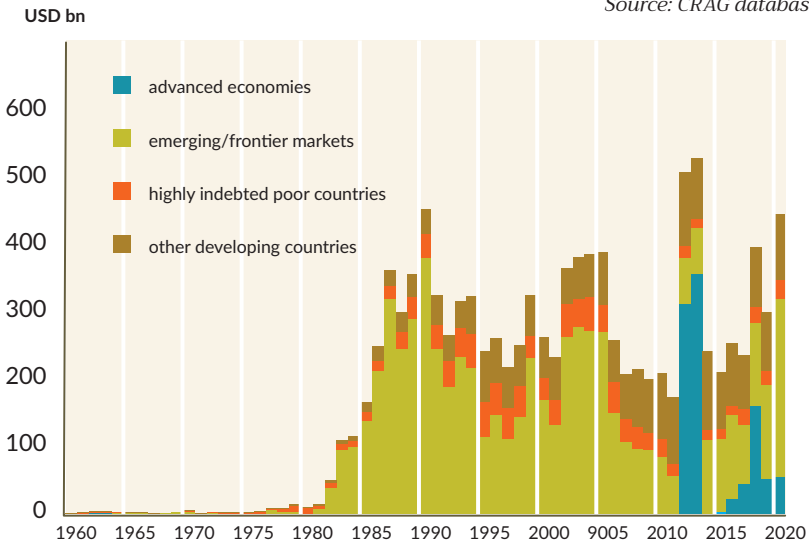


Figure 2.7: Public debt in default in the world

Source: CRAG database



REFERENCES

- Ábel, I. – Lehmann, K. – Tapaszti, A. (2016): A pénz és a bankok ellentmondásos kezelése a makroökonómiában (The controversial treatment of money and banks in macroeconomics). *Hitelintézeti Szemle (Financial and Economic Review)*, Vol. 15 Issue 2, pp. 33-58.
- Bloom, D.E. – Canning, D. (2008): Population Aging, Human Capital Accumulation, and Productivity Growth, *Population and Development Review*, Vol. 34, pp. 17-51.
- Nordhaus, W.D. (1993): Optimal Greenhouse-Gas Reductions and Tax Policy in the 'Dice' Model. *American Economic Review* 83 (2): 313-17.
- Pindyck, R.S. (2013): Climate Change Policy: What Do the Models Tell Us? *Journal of Economic Literature*, 51 (3): 860-72.
- Swiss Re (2021): The economics of climate change: no action not an option. Swiss Re Institute, April 2021 <https://www.swissre.com/dam/jcr:e73ee7c3-7f83-4c17-a2b8-8ef23a8d3312/swiss-re-institute-expertise-publication-economics-of-climate-change.pdf>

KRISTÓF LEHMANN

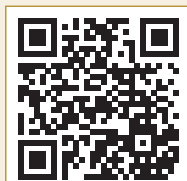
ONLY CHANGE IS PERMANENT

Economics on the brink
of another change

*“The essence of scientific thinking
is that we are not stuck with
any one certainty, with any one world
view, but are always ready to change it.”*

(Carlo Rovelli)

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



The very nature of scientific thinking is one of constant change, with ever newer and more precise systems of thought emerging to understand reality. This principle is illustrated by the development of the science of physics, to cite just two well-known examples: In the 16th century, Copernicus went beyond Ptolemy's world model to create heliocentrism. And Einstein showed in the early 20th century that Newton's system, thought to be perfect, only holds true under certain conditions; it is a special case of a more comprehensive system, described by Einstein's theory of special and general relativity.

In the social sciences, this change is driven not only by the need for better understanding, but also by the fact that the object of study – the society or the economy – is constantly changing. Today, the process of digitalisation, the new wave of globalisation based on digitalisation and the social changes they bring as well as the problems arising from the global depletion of natural resources have challenged economic thinking in an unprecedented way.

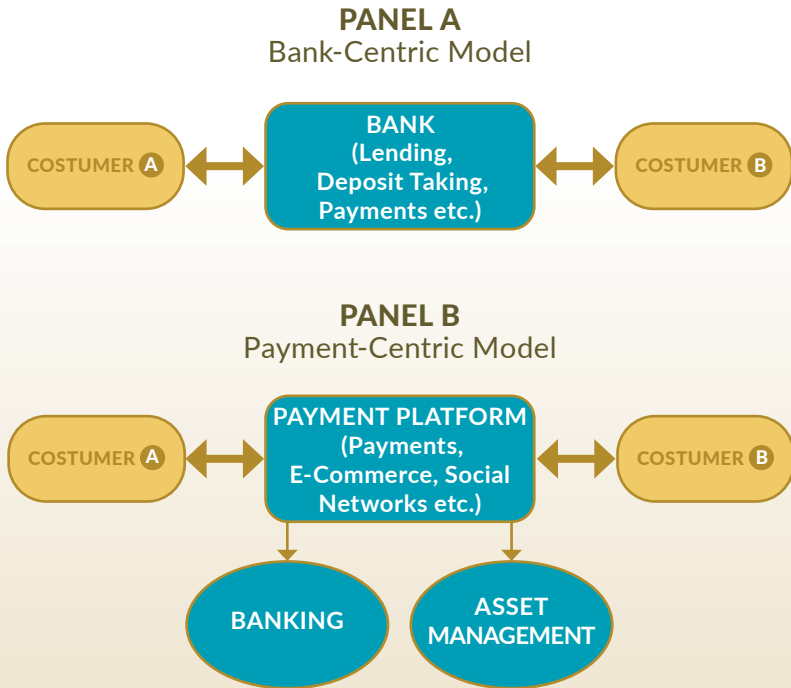
A NEW ECONOMIC PARADIGM IS NEEDED

It is increasingly clear that technological developments in the form of digitalisation, automation and robotisation are leading to revolutionary changes. Digitalisation is transforming not only production and trade, but also the way people interact and think. In this globalised world, where everything is interconnected through new networks, traditional economic policies are increasingly ineffective and the role of the state in the emerging global ecosystem needs to be reconsidered.

We have also reached a turning point in the economy's relationship with the natural environment and natural resources. There are many examples in the past where the depletion of natural resources has led to the collapse or at least to the irrelevance of societies. However, these were all local events. By contrast, for the first time in history, we are now faced with the prospect that if humanity does not manage its resources sustainably, it could use up its resources at a global level.

Economics must also face up to these changes and become capable of interpreting these phenomena properly, and then supporting economic policy on this basis, so that it can provide adequate responses to the global problems of the future. This is the main challenge for economists in the coming decade.

Figure 3.1:
Traditional and platform-based financial services
Source: Brunnermeier, James and Landau (2019)



CENTRAL BANKS MUST KEEP PACE WITH THE DIGITAL FINANCIAL REVOLUTION

One of the most spectacular advances in digital technologies can be seen in the field of finance: new forms of digital currencies are emerging in the private economy in unprecedented forms, and major central banks are on the verge of introducing their own digital currencies. **Digital money represents a paradigm shift that is on par with the shift from commodity money to precious metal money and from there to credit money.**

These new forms of money can provide specialised services that traditional forms cannot, as they are linked to platforms that are increasingly complex and form an “ecosystem” of their own (*Figure 3.1*).

How can central banks maintain their influence in conjunction with the rise of new digital currencies? To this end, it is essential that central bank money retain its role as a unit of account, which is the most important and fundamental function of money. In this case, the central bank would still be able to control financial processes even if central bank money is not used as a medium of exchange or store of value. If the central bank money is the unit of account, the central bank will still be able to set a reference rate that affects the entire financial system through arbitrage.

The current digitalisation of money is not only a neutral technical change, but also a **qualitatively new phenomenon** which strongly influences the existing system of national or regional currencies based on central bank money. As responsible central bank behaviour is necessary to maintain financial stability and optimal currency areas, it is of paramount importance from the perspective of society that central banks are able to respond to these new developments.



THE FUTURE
OF MONEY

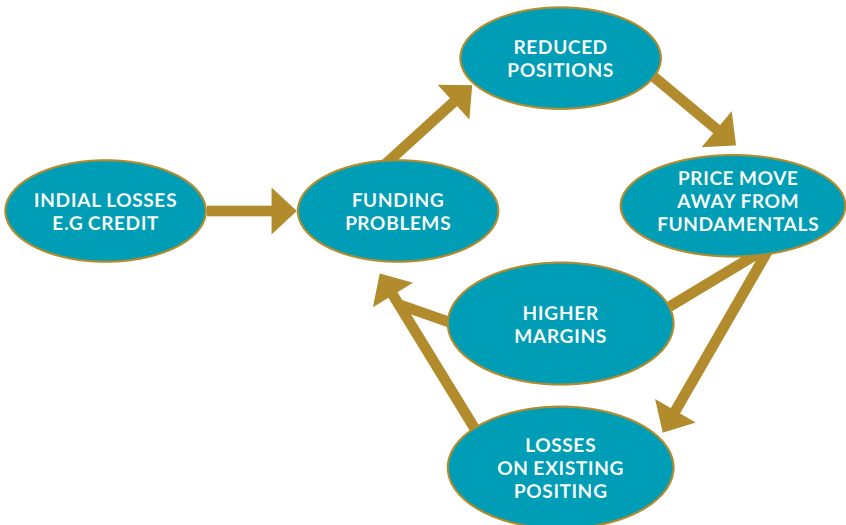
Figure 3.2: A classic bank panic

Source: Gorton (2010)



Figure 3.3: The loss–margin spiral

Source: Based on Brunnermeier (2009), own edit.



AMIDST THE CHANGE, SOME THINGS REMAIN THE SAME: THE RISK OF FINANCIAL CRISES

The 2007–2008 financial crisis caught most economists and academic researchers by surprise, just as it did the business world and economic policymakers. This was the case despite the fact that financial crises have a long history and, despite modern financial innovations, the 2007–2008 crisis was in many ways similar in substance to previous crises.

According to Gorton (2009, 2010, 2012) and Shin (2010), one of the common features of past and modern financial crises is that economic agents, and especially financial institutions, tend to be over-optimistic and underestimate risks during booms, and therefore systemically take more risks than is socially optimal.

The other common feature of past and present systemic crises is that the liability side of the financial system is fundamentally fragile. In concrete terms, this means that the liability side of banks and other financial institutions contains a significant amount of short-term debt, while the asset side is dominated by long-term investments. In normal periods, this difference in the average maturity of the asset and liability sides is not a problem, and banks and other financial institutions handle this issue with their liquidity management. But in times of crisis, investors panic and withdraw their short funds from the banking system. This process occurs in classic banking crises (*Figure 3.2*), as well as in modern financial market crises (*Figure 3.3*).

The key takeaway from this is that, **despite all the changes, the financial system must be regulated**. Historical banking crises were brought to an end by a regulatory measure: the introduction of deposit insurance. From the 1980s onwards, however, it was increasingly seen that the disappearance of crises was due to the efficient functioning of markets and the development of finance, and a wave of financial deregulation was set in motion that contributed to the emergence of an unregulated shadow banking system. The lesson of the classic banking crises, namely that the financial system is fundamentally vulnerable and exposed to liquidity panics, was not understood. In the digital financial system, despite all its advantages, there will be just as much over-optimism as there will be a tendency to liquidity crises. The resulting risks can still only be mitigated by appropriate regulation. Digitalisation is a huge opportunity, if we use it wisely. But it also involves serious risks, if we do not create an appropriate regulatory environment.



THE FINANCIAL
CRISIS

ROBOTS WILL NOT TAKE OUR JOBS, BUT ONLY IF WE STAY CREATIVE

In the past, major technological changes have always been accompanied by the mechanisation of a part of the work process, and as a result many people lose their jobs. In this context, concerns that the spread of digitalisation, artificial intelligence and robots will have similar effects may seem justified. However, historical experience also shows that job losses were only temporary, as the changes in technology also created new industries, the labour needs of which offset the preceding negative labour market effects.

The question is whether this process will be repeated in the current technological revolution based on digitalisation, or we are now faced with a new and unique phenomenon to which previous experience does not apply.

There is a chance that technological advances will create new tasks that require human intervention. For example, according to Lin (2011), 18 per cent of current jobs did not even exist at all before 1980. In addition, the last ten years also saw the emergence of many new professions, most of which are related to digitalisation.

That said, it must be seen that all this is only a possibility: there are no guarantees that the new jobs will be filled by those who have lost their jobs due to automation and robotisation. **This requires continuous improvement in the quality of human capital and implementation of the principle of lifelong learning.** The state must also play an active role in this process, not only by helping to retrain those who lose their jobs, but also by ensuring that students acquire the skills during their public education to help them adapt more easily and quickly to changing circumstances.

Digitalisation will change the way we work in general. The flexibility of work is becoming more valuable, both in time and space and in its form. This will also facilitate a new wave of globalisation, as digital nomads will play an increasingly important role, with a significant proportion of work tasks being done from anywhere in the world. Human knowledge will remain a key factor for development, but to enable broad sections of society to participate in this process, even greater emphasis will have to be placed on education and on developing human capital more intensively than in the past.



REFERENCES

- Brunnermeier, M.K. (2009): Deciphering the Liquidity and Credit Crunch 2007-2008, *Journal Of Economic Perspectives*, 23(1), Winter 77-100.
- Brunnermeier, M.K. – James, H. – Landau, J.-P. (2019): The Digitalization of Money, NBER Working Paper, WP 26300.
- Gorton, G.B. (2009): Slapped in the Face by the Invisible Hand: Banking and the Panic of 2007, paper prepared for the Federal Reserve Bank of Atlanta's conference.
- Gorton, G.B. (2010): Slapped by the Invisible Hand: The Panic of 2007, Oxford University Press.
- Gorton, G.B. (2012): Misunderstanding Financial Crises – Why We Don't See Them Coming, Oxford University Press.
- Lin, J. (2011): Technological Adaption, Cities and New Work. *Review of Economics and Statistics*, 93(2), 554-574.
- Shin, H.S. (2010): Risk and Liquidity, Oxford University Press.

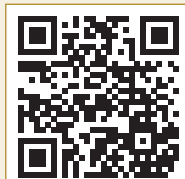
ZOLTÁN SZALAI

WE ARE ENTERING
A NEW TECHNOLOGICAL
ERA

*At the heart of capitalism
is creative destruction.”*

Joseph A. Schumpeter

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



The current digital technology revolution is opening up previously unimaginable opportunities, but as with previous industrial revolutions, many are anxious about the potential negative consequences. This dichotomy is still palpable today. Can the social and environmental damages caused by technological change be avoided? Can individuals and communities learn from the experiences of past technological revolutions?

INDUSTRIAL REVOLUTIONS HAVE GEOPOLITICAL AND SOCIAL IMPACTS

We have precedents to judge the impact of the current digital industrial revolution, as this is the fifth wave of industrial revolutions in the last two centuries or so.

Before the first industrial revolution that originated in Western Europe in the final third of the 18th century, technological change was slow and social change was gradual. The Industrial Revolution, however, ushered in an era of rapid technological and social changes that were palpable even to contemporaries. In general, significant new production processes involving several sectors of the economy are accompanied by new transport, distribution, lifestyles and consumption patterns, which are interlinked, intrinsically supportive and conditional on each other. **The industrial revolutions represent new techno-economic paradigms, transforming every aspect of societies' lives and even the way we think about the economy and the world at large.**

The **first technological revolution** was based on the use of hydropower and revolutionised the textile industry. Water-powered manufactories took root in the countryside, where guild privileges and competition restrictions did not apply, in contrast to the urban guild industry. The construction of the canal network required a huge amount of financing, which was covered by issues of shares. But investor euphoria ended in a financial crisis. This was followed by a period of consolidation, rapid economic growth and prosperity, which resulted in Great Britain becoming the world's leading power.

In the **second technological revolution**, steam-engine-based manufacturing became dominant, combining the division of labour typical of manufactories with the power of steam engines, and providing an additional wage advantage by allowing the use of female and child

Figure 4.1: Innovation waves

Source: Stern (2015)

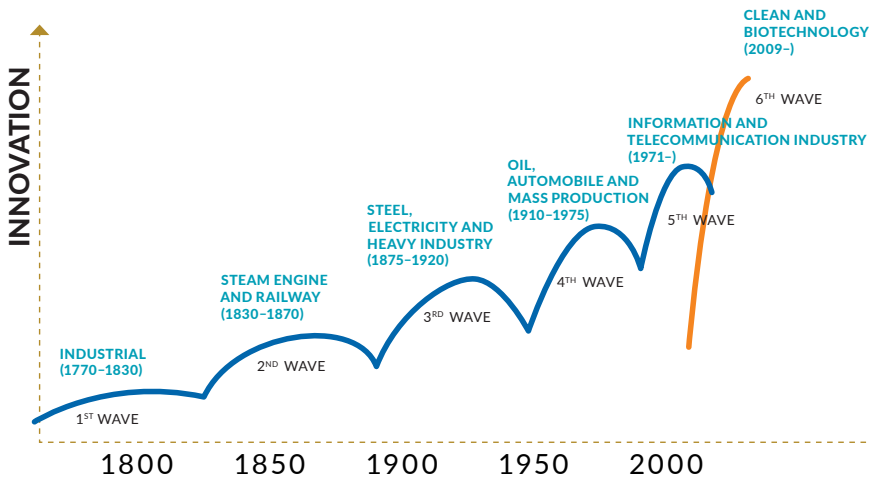


Figure 4.2: Five technological revolutions and their turning points

Source: Perez (2002)

Waves of industrial revolutions	LEAD-UP PERIOD			TURNING POINT	DEVELOPMENT PERIOD	
	Starting date	Country of origin	Bubbles of the supposed golden age	ECONOMIC CRISES	Golden Age	Stage of maturity/decline
1. First industrial revolution	1771	England	Canal mania in England	1793-'97	Rapid development of the United Kingdom	1813-1829
2. Age of steam and railways	1829	England	Railway mania in England	1848-'50	Victorian economic boom	1857-1873
3. Age of steel and heavy industry	1875	England, USA, Germany	Building global infrastructure funded from London	1890-'95	Age of progressive development in Europe and the USA	1908-1918
4. Age of mass-produced cars and oil	1908	USA	Roaring Twenties in America	EU 1929-'33 USA 1929-'43	Peaceful golden age after the World Wars	1960-1974
5. IT revolution	1970	USA	Internet mania	2000-'03 2008-'20	Is a global golden age sustainable?	



ADAM SMITH:
THE PIN FACTORY



BRIDGEWATER
CANAL 1920

labour. The typical transport infrastructure was the railways, the construction of which was again accompanied by financial euphoria, along with the inevitable collapse. The ensuing period of consolidation ushered in the Golden Age of the Victorian Era in England. ◀

The **third technological revolution** brought the dominance of **iron, steel and heavy industry**. Emerging as new powers, the USA and Germany challenged Great Britain's leading role. As a global financial centre, London supported the development of transport and communication networks linking continents. The decades before the First World War were known as the "happy times of peace" (*"Belle Époque"*). The shift in the global economic balance of powers led to world political rivalries, the First World War and the territorial redistribution of the world. ◀

The **fourth technological revolution** came in the turbulent 1920s (the "Roaring Twenties"), the era of jazz and modernism. It featured the spread of **mass consumption** and mass democracy. Technology reflected the Taylorist principles of work organisation. The **assembly-line production** developed at Henry Ford's car plant delivered unprecedented levels of productivity. Through the rivalry between socio-economic systems, mass production and mass consumption have shown that **different social systems can be built on similar technical and technological foundations**, such as the American and British welfare capitalism, national socialist/corporatist and state socialist systems. The decades following the Second World War brought perhaps the most rapid development in human history, a period of mass production and consumption and general prosperity. **The end of this golden age**, based on the impending depletion of natural resources, **was marked by the dramatic rise in energy and raw material prices in the 1970s**. ◀

The conditions for the **fifth technological revolution**, the **digital and green transition**, were already emerging in the 1970s. Microelectronic devices, semiconductors and transistors had already been developed, making it possible to reduce the weight and material requirements of products very significantly and to use products in a smart way. The 1980s were characterised by the restructuring of large organisations and the outsourcing of activities, the undesirable effects of which also appeared in the financial sector. Once again, optimism about new technologies led to over-investment, over-pricing and the so-called **high-tech bubble** in the 1990s. But after the bubble burst, we entered a more consolidated period, in which digitalisation is increasingly pervasive in our daily lives. ◀



THE FIRST INDUSTRIAL
REVOLUTION



BELLE ÉPOQUE

CHARLIE CHAPLIN:
MODERN TIMES



ILLÉS EGYÜTTES
(HUNGARIAN BAND):
TÁSKARÁDIÓ



The development of a digital infrastructure will enable the efficient use of digital tools and smart technologies. Today's biggest companies now offer some form of digital solution, as opposed to the corporations of the past which sold physical products, and are built on the benefits of networking. Artificial intelligence and robotisation are transforming workflows in all areas of life, from manufacturing through warehousing and transport to consumption. The competition law regulation of new large corporations requires a new approach to prevent and eliminate monopoly situations.

THE DIGITAL TECHNOLOGICAL REVOLUTION: POWERLESSNESS OR DIGITAL FEUDALISM?

The nature of the “product” itself is changing radically. **The digital product is not physically consumed by the user and, once produced, it can be copied almost indefinitely and at no cost.** These new types of products require a new legal environment in which copyright and intellectual property rights play a central role.

Digitalisation also requires a change in the legal environment **on the users' side.** New technologies pose unprecedented challenges regarding the protection of personal data and privacy.

New digital technologies render obsolete the old bureaucratic and hierarchical corporate structure, with its many levels of management and elaborate career paths. Instead, they allow for **“flat”, horizontal, flexible, changeable work organisations requiring creative work tasks,** with few levels of management and with all workers participating in decision-making. **The forms of ownership may also change accordingly,** with employees becoming shareholders instead of the previous rigid owner–manager–employee structure. The different digital technologies support a variety of organisational forms. While **blockchain** technology is promoted by its proponents as an alternative to a bureaucratic organisational structure based on the concentration of power, the technology is in fact based on a centralised algorithm, is not scalable, i.e. (the size of the network cannot be increased indefinitely) due to the verification (validation) method used, and is extremely wasteful in its use of energy. However, there are algorithms that are free of these drawbacks. One example is the **holochain** technology, which features an open architecture (open source) and is scalable, and the validation process is much less wasteful in terms of energy and time.

Figure 4.3: Blockchain or holochain

Source: Cloudthings (2021)

BLOCKCHAIN

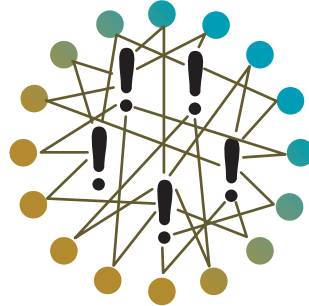
"many eyes looking at one problem"



- Centralised, network-wide validation
- The whole network must be updated at the same time (even for those not involved in the transaction)
- Trust is either extended to the whole network or lost
- 99.99 per cent of the data generated is redundant

HOLOCHAIN

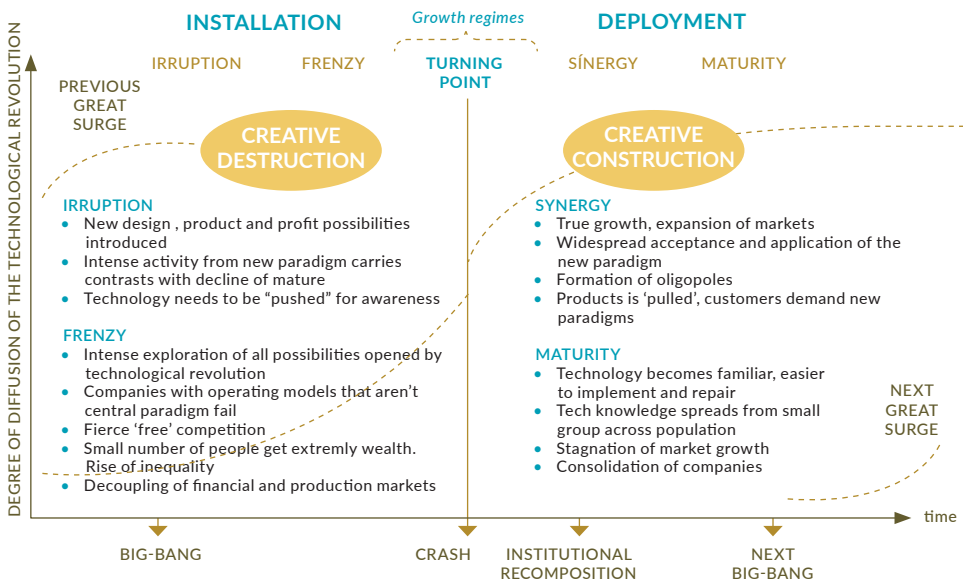
"many eyes looking at multiple problems"



- Distributed (decentralised), individual validation
- The network is updated simultaneously, not in unison, at the same time
- Trust is built on an individual basis (directly in the transactions)
- All data that is generated is relevant and must be kept

Figure 4.4: Features of the industrial revolutions that can be generalised

Source: Perez (2002)



TECHNOLOGICAL REVOLUTION: CREATIVE DESTRUCTION?

A new technical-economic paradigm is already emerging as the previous paradigm declines and is rendering it obsolete at an ever faster pace. This process of creative destruction is accompanied by socio-economic tensions, as economic and social positions are rearranged, with some rising and others falling. It is attracting more and more investors, and usually financial overheating and the inevitable financial crisis put an end to the stormy expansion phase. In the calm period following the financial collapse, the paradigm develops its own, unique forms of production, distribution and consumption, i.e. a new lifestyle.

The history of technological revolutions shows that societies can make the transition easier for the disadvantaged. Failure to do so, however, could lead to serious social and economic tensions, which could hold back the transformation. **Today, delay is particularly dangerous because we are hitting the limits of natural resources and sustainability, so any delay increases the risk of irreversibility.**

FUTURE IS DIGITAL AND GREEN

Our era seems to be the phase of propagation and consolidation of digitalisation. **Digitalisation has been with us for a few decades, but only recently has it started to show its true potential on a massive scale through the widespread use of smart solutions and artificial intelligence.** In an optimistic scenario, societies will be able to reconcile the legal environment and the use of technology with the protection of personal data and the avoidance of “digital feudalism” or “surveillance” capitalism. Today, there are still differences in the responses to digital and sustainability challenges. Europe is at the forefront of individual sensitive data protection and digital self-determination. The USA seems to be less sensitive to this when it comes to compromising the competitive advantage of its globally leading corporations. In Asia, people tend to accept the primacy of public interest, public policy and global competitiveness over the protection of individual data (e.g. China, Singapore).



REFERENCES

- Brynjolfsson, E. – McAfee, A. (2012): *Race Against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*, Digital Frontier Press.
- Cloudthings (2021): Can Holochain Help Blockchain? <https://cloudthings.medium.com/can-holochain-helpblockchain-4b24b1b7e13>
- Perez, C. (2002): *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages*, Edward Elgar, Cheltenham, UK.
- Perez, C. (2021): Using the history of technological revolutions to understand the present and shape the future. <https://ppstaging.feps-europe.eu/debates/next-economy/using-the-history-of-technological-revolutions-to-understand-the-present-and-shape-the-future>
- Schumpeter, J.A. (1934): *The Theory of Economic Development*, Cambridge, Mass. Harvard University, Hungarian edition: *A Gazdasági Fejlődés Elmélete* (Translator: Tamás Bauer), Kjk, 1980.
- Stern, N. (2015): Why are we waiting? The logic, urgency, and promise of tackling climate change. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2015/06/Stern_Why_Are_We_Waiting_Presentation_FINAL.pdf

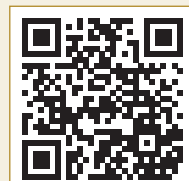
BALÁZS ISTVÁN HORVÁTH,
NORBERT KISS M.,
PÁL PÉTER KOLOZSI

MULTIDISCIPLINARITY AND ECONOMICS

What can economists
learn from
other disciplines?

*Economic processes need to be
examined across a broad spectrum,
including sustainability and stability aspects.
This approach can be supported
by learning from other disciplines,
as was the case in the early days
of economics.”*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



The history of science is a history of continuous development.

Although the questions to be answered are given, the approaches used to answer them may vary. In this respect, economics is no exception, especially now that the coronavirus pandemic has put an end to the era of predictability, and we can prepare for the synergy that comes from the dialogue between disciplines to become increasingly prevalent. So let's look at what economics can learn from other disciplines.

ECONOMICS FOR UNCERTAIN TIMES: WHAT CAN WE LEARN FROM QUANTUM PHYSICS?

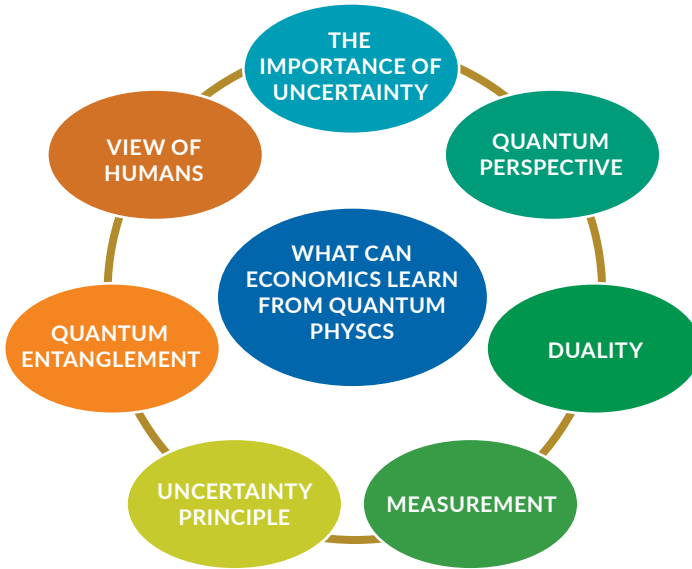
The Newtonian view that the economy can be viewed mechanistically, as a machine that always responds to certain inputs with the same outputs, still pervades general economic thinking today. According to Orrell (2018), the quantum approach differs from this – let's see how.

- 1. The importance of uncertainty.** All measurements are uncertain, i.e. “We got probability instead of certainty in the global quantum world to make rational decisions.” (Matolcsy, 2021).
- 2. Quantum perspective.** When examining the economy, the focus should be on money that corresponds to the energy of the economy.
- 3. Duality.** Based on the duality of the wave particle, duality also characterises money, which has both a physical form (coins, banknotes) and a virtual form (electronic money).
- 4. Measurement.** Just as quantum physics sees quantities as fundamentally uncertain, the concept of value is very uncertain for economists.
- 5. Observer effect and uncertainty principle.** The measurement influences the measured system (uncertainty principle): today's price affects future prices, and theories about the economy shape the way the economy works.
- 6. Quantum entanglement.** Money is a linking instrument – just think of lending, which by definition links the borrower and the depositor.
- 7. View of humans.** The decisions taken by economic agents are strongly influenced by the fact that they are intertwined, while often being indecisive and sometimes reaching paradoxical conclusions.

Economics is not the “science of scarcity”, but the “science of money”, since the basic units of economic life are always monetary transactions, which of course cannot be imagined without money.

Figure 5.1: Connection points between quantum physics and economics

Sources: own compilation, based on Orrell (2018)



“THE NEWTONIAN VIEW THAT ECONOMY CAN BE VIEWED MECHANISTICALLY, AS A MACHINE THAT ALWAYS RESPONDS TO CERTAIN INPUTS WITH THE SAME OUTPUTS, STILL PERVADES GENERAL ECONOMIC THINKING TODAY.”

ECONOMICS AND BIOLOGY: THE ROLE OF THE NERVOUS SYSTEM IN OUR DECISIONS

Scientific advances in biology, particularly in neuroscience, are providing previously unimaginable insights into the workings of the human brain, and are making a major contribution to the development of economics in understanding decision-making mechanisms. Let us examine some examples of the above:

- 1. Temporal and intertemporal aspects of decisions.** We value and price the same goods differently at different times, so our decisions may differ even with the same economic inputs.
- 2. The social aspects of decision-making.** Brain function and economic decisions are also influenced by factors such as trust, mutual-ity, fair treatment and reciprocity.
- 3. Decision-making under pressure, in uncertain and risky situations.** Neuroeconomics takes into account that stressful situations, uncertainty and unprecedented situations affect human reactions, risk preferences and loss aversion.

INTEGRATING PSYCHOLOGY: THE RISE OF BEHAVIOURAL ECONOMICS

Alongside neuroeconomics a more well-known school of thought on the analysis of human behaviour is behavioural economics, which is increasingly becoming part of the mainstream of economics. As Nobel laureate in economics Richard Thaler put it: **“Behavioural economics may become so successful that it will eventually disappear, since all economics will be as behavioral as the topic requires.”**

The focus of behavioural economics is on bounded rationality, the importance of which was first highlighted by social scientist Herbert Simon (Simon, 1955). It is easy to see that the actor of classical economic models, the rational homo economicus, in many cases does not adequately map the processes that take place in reality. Cognitive biases relative to rationality and their effects on decision-making have been incorporated by economists primarily into microeconomic models and hence into economic policy research and behavioural finance. **The often imperfectly rational, micro-level decisions of individuals can also have an impact at the level of the economy as a whole, influencing not only financial markets but also macroeconomic cycles.**





PRESENTATION
BY RICHARD THALER
AFTER RECEIVING
THE NOBEL PRIZE IN 2017

NETWORK, SYSTEMS AND COMPLEXITY THEORY FROM AN ECONOMIST'S PERSPECTIVE

Globalisation and digitalisation have increased the role of networks in understanding society and economy. Some examples where network theory can complement economics (based on Easley and Kleinberg, 2010):

- 1. The mechanism of changes and shocks to the system.** The network topology and the density of connections affect the impact of shocks in the system.
- 2. Systemic risk.** Highly interconnected events and actors can threaten the stability of the system itself through frictions and risks in the system.
- 3. The significance of power functions.** Network theory has shown that processes in complex systems are very often best described by power distributions (Barabási, 2010).
- 4. Circumvention of systems and financial collapses.** Complex economics should view the economy as a complex network of incentives and interests, in which there is scope for manipulation and hence for the collapse of the system.
- 5. Markets as a network.** In the market's network of sellers and buyers flow goods, commodities and their countervalues, as well as information.

INFORMATION TECHNOLOGY, DIGITALISATION AND ECONOMICS

The combination of economics and technological development can give rise to new solutions and concepts, from which economics can learn, based on the massive success of BigTech/FinTech companies and their dynamically growing capitalisation.

- 1. Automatic and self-developing economy.** The development of digitalisation and information technology is increasingly enabling automation in almost all areas of the economy.
- 2. The spread of disruptive technologies.** New technologies need to be adopted by a wide range of actors and spread widely, before society can adapt.
- 3. In-house interdisciplinary division of labour.** Not only fintech companies, but also traditional financial institutions are increasingly hiring employees with different professional backgrounds, such as computer scientists, physicists and mathematicians.
- 4. Ecosystem building.** BigTech companies are not just developing products, they are building ecosystems.
- 5. Social effect.** Technological progress may have implications not only for economic growth, but also for the stability of the social order, including democracies.

BACK TO BASICS: THE IMPORTANCE OF HISTORICAL EXPERIENCE

It is time for economics to move beyond the approach that historians are only there to find illustrations for economic theories. **After all, economists can learn from historians – since all empirical research is an analysis of economic history, and there is always empirical support behind serious theories.**

Economic historians can bring economic theories, which are born as theoretical constructs, closer to reality as they test them thus helping to fine-tune any theories and correct errors that cannot be supported by evidence. Economic history is precisely concerned with

1. what has enabled growth and development in specific cases, and
2. how, why and when changes of importance to the economy have occurred, with a particular focus on the substantive factors affecting long-term growth.

There is much to be learned from examples that “stood the test of reality”. Nevertheless, it is also true that it is not advisable to assess past economic processes too much through the “economist’s eye” or too much through the “historian’s eye”, but that a balance between the two approaches should be sought.

LANGUAGE AS A FACTOR IN SHAPING THOUGHT

The nature of the relationship between behaviour, culture and language remains an unresolved question, but the general view among linguists is that language can influence thinking. Different groups of people may approach certain abstract topics or even practical problems differently, depending on the relevant terms they use, some examples of which are collected by Boroditsky (2017) and Ginsburg and Weber (2020):

1. **The perception of time.** The representation of time as an abstract concept varies from language to language. The linguistic interpretation of time can also influence decisions that are explicitly economic. Users of languages in which the future is more strongly marked may perceive it as more “distant” and discount future events more.
2. **The language interpretation of intentionality and responsibility.** Whether an event is intentional or accidental is emphasised differently in different languages, which may influence the degree of responsibility attributed to the perpetrator of an act or the cause of an accident.
3. **Spatiality and directions.** In some languages, even basic things such as directions are expressed differently, which can affect the ability of orientation.



INTERVIEW WITH
CLAUDE DIEBOLT

***LANGUAGE IS NOT ONLY A NECESSARY
FACTOR FOR ECONOMIC INTERACTIONS,
AS IT CAN BE SEEN AS A COMMUNITY
CONVENTION SHAPED BY NATIONAL
SPECIFICITIES AND CULTURAL HERITAGES,
WHICH IS IN CONSTANT INTERACTION
WITH THE MINDSET OF ITS USERS.***



TED TALK
BY COGNITIVE SCIENTIST
LERA BORODITSKY

REFERENCES

- Barabási, A.L. (2010): Villanások (Flashes). Nyitott Könyvműhely.
- Boroditsky, L. (2017): How language shapes the way we think. TED, November 2017.
- Easley, D. – Kleinberg, J. (2010): Networks, Crowds, and Markets: Reasoning About A Highly Connected World. Cambridge University Press.
- Ginsburgh, V. – Weber, S. (2020): The Economics of Language. Journal Of Economic Literature, 58 (2): 348-404.
- Matolcsy, Gy. (2021): Új Fenntartható Közgazdaság II. (New Sustainable Economics II) <https://novekedes.hu/mag/matolcsy-gyorgy-uj-fenntarthato-kozgazdasag-ii>
- Matolcsy, Gy. (2021): Rational Expectations Are Still Possible <https://www.mnb.hu/en/pressroom/publications-of-the-governor/2021/Matolcsy-Rational-Expectations-Are-Still-Possible>
- Orrell, D. (2018): Quantum Economics: The New Science of Money. Icon Books.
- Simon, H.A. (1955): A behavioral model of rational choice. The Quarterly Journal Of Economics, Vol. 69, N. 1, February: 99-118.

II

**The new economy
is based on
new resources**

PÉTER HUGÓ ASZTALOS

KNOWLEDGE

Talent and creativity
are the true sources
of economic growth

*“Knowledge, capital, talent and
technology are becoming more
important, as they will be
the sources of economic growth.”*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



The 21st century brought several changes to the development of humanity, and one of the most profound shifts has been the growing significance of knowledge. Nowadays, the main source of wealth is not land, raw materials or simply population size, but instead intellectual capital, talent and creativity, as shown by the example of the largest corporations in the world. To understand the far-reaching consequences of this change, we have to think about the meaning of knowledge in today's world, and its impact on day-to-day life and economic thinking.

In the age of the internet, real value is not derived from acquiring information, but rather from linking pieces of information and establishing new correlations. In order to preserve and enhance children's creativity, efforts should be made to ensure that young people are in an inspiring environment in educational institutions and outside them as well. The key question for education in the 21st century is whether students come to love the process of learning and whether they can be convinced to continue to train themselves and improve their skills throughout their lives, even after leaving the school system.

KNOWLEDGE IS THE BASIS FOR THE NEW SUSTAINABLE ECONOMICS

Knowledge is the basis for the new sustainable economics, on which individuals and nations that seek to achieve success need to build their strategies in the 21st century. During its technological and cultural development, humanity has reached the level where the economy is no longer based on material goods, but instead on an intellectual resource: knowledge (Matolcsy, 2021). Rather than the quality of arable land or the amount of precious metals and oil within a country's borders, the success of a nation now basically depends on the knowledge, talent and creativity of its citizens.

Today, it can be seen in many walks of life that the greatest value of the 21st century is information, or its processed form, data. The growing significance of information and knowledge profoundly changes how the world operates, and thus also economic thinking. In many other respects, knowledge also has different characteristics than the material goods that used to determine the operation of the economy. The amount of material goods diminishes as they are used. By contrast, knowledge is an economic resource that is able to exponentially expand through use (sharing) (Matolcsy, 2021).

Figure 6.1: Relationship between talent attraction and economic performance in European Union countries)

Source: Eurostat, 2021; IMD, 2020

Note: GDP for Ireland and Luxembourg are outliers, so they are not included here. Malta is not included in the World Talent Ranking.

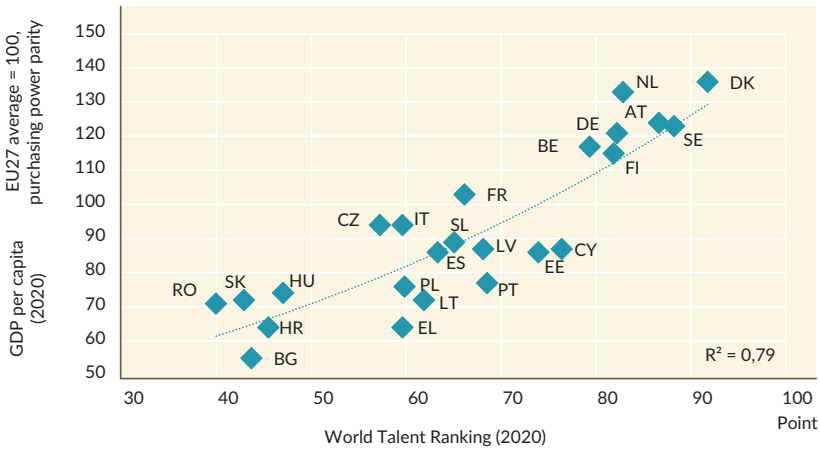
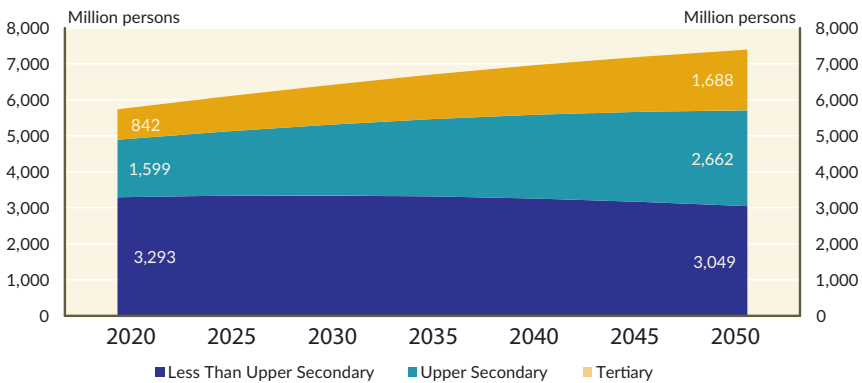


Figure 6.2: Distribution of the world's population by educational attainment (estimate, 2013)

Source: Roser – Nagdy, 2013

Note: In the population over 15 years of age.



It follows from knowledge's capacity for such exponential expansion that one of the basic tasks of economics, the issue of distributing scarce resources, is put in another light. What happens when the economy is no longer built on scarce material goods, but on something that expands rather than diminishes while being used? In such a system, the rational thing to do is to continue consuming knowledge, which in turn leads to further growth in available knowledge. **Therefore, in theory, the knowledge-based economy is not constrained by scarce resources, it is characterised by universal abundance, where continuously expanding knowledge facilitates a steady stream of new technological revolutions.**

However, knowledge cannot expand indefinitely, as it hits barriers in many respects. Gaining knowledge and learning requires time and energy, which are limited resources. Diligence, talent, creativity and the available time fundamentally determine the efficiency of learning and the amount of knowledge that can be acquired, so these are the actual bottlenecks of infinite knowledge. These features and factors can be found in every nation, and yet the different countries translate them into economic growth with varying success (*Figure 6.1*).

The main challenge of the 21st century is whether human society can achieve a turnaround in competitiveness, within such constraints, where new technologies ensure the long-term sustainability of communities (Matolcsy, 2021). **The future and success depend on how new value can be created from the accumulated knowledge.** Talent and diligence can be found in everyone, but they are not realised in the same way in all people. That is why establishing an inspiring and supportive environment, recognising and strengthening talent, and acknowledging and rewarding diligence are crucial.

EDUCATIONAL SYSTEMS NEED TO BE RETHOUGHT

Many factors suggest that educational systems should be thoroughly reviewed and revamped worldwide, starting as soon as possible. Every educational system in the world is struggling with the challenges of the 21st century. **The expansion in the channels for acquiring knowledge and information has disrupted the centuries-old structures of educational systems, and currently countries do not seem to have been able to systemically address this challenge.**

Figure 6.3: Key skills in the 21st century

Source: Prievara, 2015

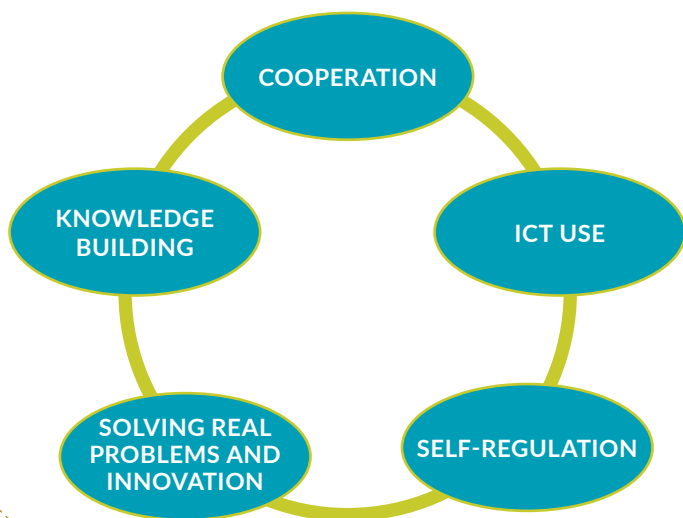
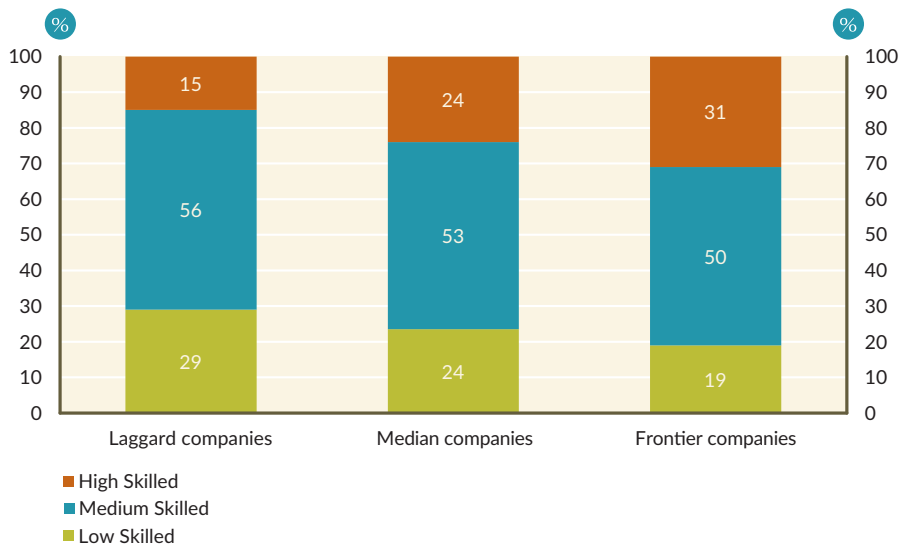


Figure 6.4: Distribution of workforce skill composition by the productivity of companies

Source: OECD, 2021

Note: The analysis covered companies of 10 OECD countries.



Educational systems have huge growth potential in the decades ahead. According to the estimate of Roser and Nagdy from 2013, the number of tertiary graduates in the world will double between 2020 and 2050 (*Figure 6.2*). However, career goals mainly related to the internet and based on interpersonal relationships are increasingly popular among the young, and educational systems in the current form do not prepare them for this. Nevertheless, these skills can be acquired through other channels, and so young people can easily be diverted from school. If schools are to remain the main channels for learning and knowledge sharing, their curriculum and teaching methods need to be revised considerably.

Employers require solid interpersonal (soft) skills in almost all jobs and therefore, the development of these skills should be a priority in public education (*Figure 6.3*). **Skills development should be an integral part of the educational process**, and instead of holding separate skills development courses, existing classes should be redesigned to improve students' knowledge and skills. However, the new teaching methods should not replace, but rather supplement traditional ones, as a well-functioning educational system needs to have the best of both worlds.

Improving the skills and fostering the talent of the workforce has a major effect on productivity and thus also economic growth. More than one-fifth of the productivity gap seen between certain companies is attributable to worker and management skills (OECD, 2021). The firms with the highest productivity employ twice as many high-skilled workers than their less productive peers (*Figure 6.4*). In other words, the long-term success of countries hinge on how effectively and quickly they can respond to the continuously changing challenges of the 21st century through their educational systems.

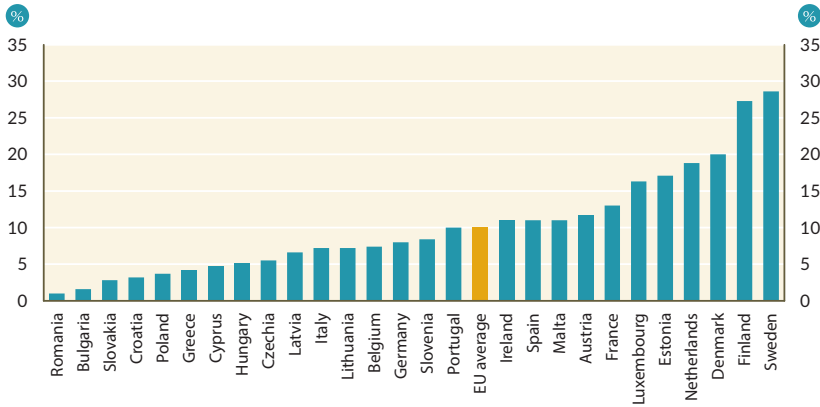


THE HUMAN SIDE OF
PRODUCTIVITY

Figure 6.5: Lifelong learning in European Union countries (2020)

Source: Eurostat, 2021

Note: Among 25–64-year-olds.



***“KIDS WILL TAKE A CHANCE:
IF THEY DON’T KNOW, THEY’LL HAVE A GO.
THEY’RE NOT FRIGHTENED OF BEING WRONG.
I DON’T MEAN TO SAY THAT BEING WRONG IS
THE SAME THING AS BEING CREATIVE. WHAT WE DO
KNOW IS, IF YOU’RE NOT PREPARED TO BE WRONG,
YOU’LL NEVER COME UP WITH ANYTHING ORIGINAL.***

***AND BY THE TIME THEY GET TO BE ADULTS, MOST
KIDS HAVE LOST THAT CAPACITY. THEY HAVE BECOME
FRIGHTENED OF BEING WRONG. AND WE RUN OUR
COMPANIES LIKE THIS. WE STIGMATISE MISTAKES.
AND WE’RE NOW RUNNING NATIONAL EDUCATION
SYSTEMS WHERE MISTAKES ARE THE WORST THING
YOU CAN MAKE. AND THE RESULT IS THAT
WE ARE EDUCATING PEOPLE OUT
OF THEIR CREATIVE CAPACITIES.”***

(SIR KEN ROBINSON)

THE SOURCE OF GROWTH IS CREATIVITY

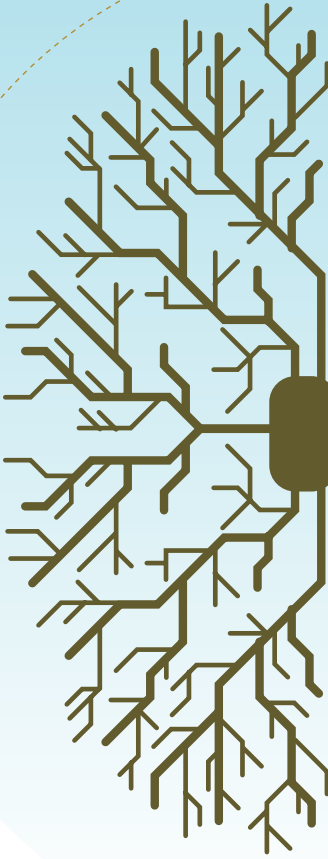
In the age of data, real value is not derived from acquiring information, but rather from the capacity of selecting and interpreting the necessary pieces of information. The difficulty is that useful, reliable information has to be extracted from a vast pool of data, and the acquired knowledge needs to be interpreted accurately and in context, and it should be linked to other, already existing pieces of information.

In addition to skills, creativity is also a key factor in innovation, which drives the world and the economy forward. In order to preserve and enhance children's creativity, efforts should be made to ensure that **young people are in an inspiring environment in the educational institutions and outside of them as well.** Carefully designed curricula cannot fill the entire time spent in school: space should be left for discussing and implementing students' own thoughts and ideas. Many of today's students will work in jobs during their lives that do not even exist yet. The most important things are keeping an open mind, daring to rethink our lives and not being afraid to change the things that can be improved.

In the future, teachers will not only be required to present the material to be learnt, but also to **structure the acquired information, identify correlations, improve critical thinking and develop the necessary skills in students to do the same.** Nations can only be truly successful if they can harness the potential in every member of society. Teachers play a pivotal role in this process, as they can recognise the talent in children with due attention, and they can guide students in the right direction with the appropriate methods. This is a broader interpretation of talent development than the one currently used, and it requires a new attitude in educational systems.

Increasing the share of tertiary graduates is one of the most important development goals in education from an economic perspective. The productivity of companies employing higher-skilled workers is higher (OECD, 2021), and a correlation can be observed between the proportion of tertiary graduates and economic performance. Tertiary education offers a positive rate of return in most OECD countries, both for individuals and for society (OECD, 2019). Moreover, the share of those with STEM degrees within society should be increased further to achieve sustainable economic growth.

ANALYTIC



CREATIVE



***BESIDES SKILLS,
CREATIVITY IS ALSO KEY IN
INNOVATION, WHICH DRIVES
THE WORLD AND
THE ECONOMY FORWARD.***



DO SCHOOLS
KILL CREATIVITY

The key question in education for the 21st century is whether students come to love the process of learning and whether they can be convinced to continue to train themselves and improve their skills throughout their lives, even after leaving the school system.

In the slowly changing world of past centuries, success rested on workers being good at the things they learned in school, whereas in the rapidly changing world of the 21st century, people need to be good at things that they never even learned (MKT, 2020). Therefore, being successful on the labour market requires continuous development and self-improvement in organised and autodidactic forms as well (*Figure 6.5*).

Technological progress and the changing concept of knowledge offer unprecedented opportunities to everyone. Nowadays, anyone can listen to online courses from the best universities in the world, irrespective of the country they live in or their age. In the age of online knowledge transfer, the initial inequalities are increasingly less important, while at the same time motivation and the presence of a supportive environment are becoming more and more crucial. **In other words, in most of the world, people have the opportunity to join the knowledge-based world. The question is how people will use this chance.** But the 21st century does not wait for anyone: only those who can respond to challenges appropriately and in due time can be successful in global competition.

REFERENCES

- Eurostat (2021): Database.
- IMD (2020): World Talent Ranking.
- Matolcsy, Gy. (2021): Új Fenntartható Közgazdaságtan I-II (New Sustainable Economics – I-II)
- MKT (Hungarian Economic Association) (2020): 58th Itinerant Conference of Economists – Competitiveness section.
- Prievara, T. (2015): A 21. századi tanár (The teacher in the 21st century).
- Robinson, K. (2007): Do schools kill creativity?
- Roser, M. – Nagdy, M. (2013): Projections of Future Education.
- OECD (2019): Education at a Glance 2019.
- OECD (2021): The Human Side of Productivity.

TÍMEA VÁRNAI

THE RELATIONSHIP BETWEEN CAPITAL AND ECONOMIC GROWTH

Shifting the focus from
quantity to quality

*“Investment is the key
to future production”*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



One of the pillars of sustainable convergence is a permanently and **sustainably high investment rate**, as investment not only generates demand, but also **produces future capacities**. However, recent economic analyses underline that the success and permanence of convergence depends on the amount of investments, as well as their structure. The role of **“smart” capital – in particular, information and communication technologies (ICT) and intangible assets** – has appreciated. “Smart” capital stimulates the entire corporate sector, while digitalisation improves the productivity of both producers and service providers.

IN ADDITION TO THE AMOUNT OF INVESTMENTS, THEIR QUALITY IS ALSO IMPORTANT

Capital has always been a major factor in growth when examined in longer-term analyses. Nowadays, it is common knowledge that one of the pillars of sustainable convergence is a permanently and sustainably high investment rate. Investments are crucial in convergence, as the expansion of capacities increases production opportunities and thus also supply. **Based on the experiences from the past 60 years, the countries that were able to escape from the middle income trap were typically those where the investment rate was steadily 25–35 per cent during the convergence period.**

However, for a long time economists included the capital formation in economic models in a simplified form, using only the quantity of capital as a homogenous aggregate. In these early theories, technological progress improved the efficiency of all capital goods and was independent from investments. According to the earlier assumptions, exogenous technological progress results in a higher return on capital, which encourages further investments.

The latest, empirical schools in capital theory focus not only on the size of capital, but also its composition, as well as the complex relationship between capital and technology. The assumption that new capital engenders a new technological level changes the direction of the relationship between technological development and capital investments in the analyses. **The higher level of technological development of new capital is what improves efficiency**, and it also supports growth by raising total factor productivity. This assumption fundamentally challenges the analyses based on the production function, along with growth accounting research, which is considered a classic method nowadays. This is because capital is not independent from technology, in fact, it may also affect other factors of production.

Figure 7.1: Average investment rate in various regions, in periods of convergence lasting for at least 5 years

Source: WDI, MNB

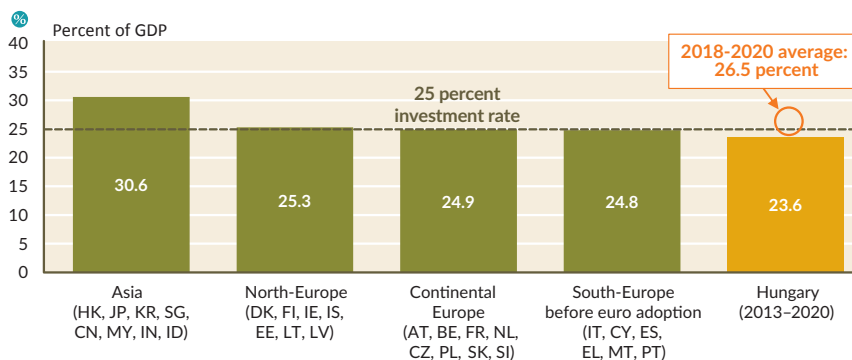
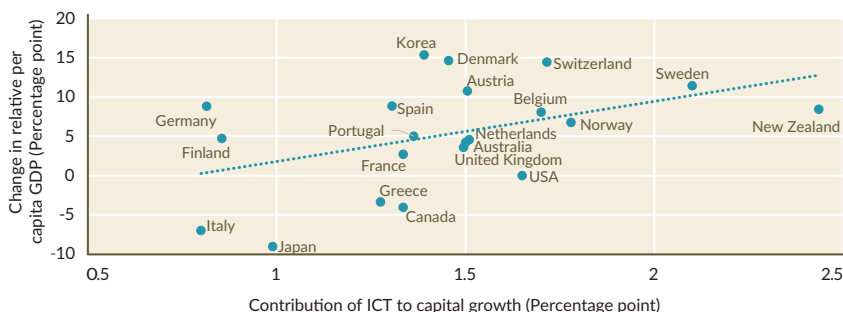


Figure 7.2: Relationship between the contribution of ICT to capital stock growth and the change in the level of development in advanced countries (2000–2019)

Source: OECD, Penn World Table

Note: Relative level of development compared to the US. Excluding Ireland and Luxembourg. No data were available on the composition of capital in Hungary.



The structure of capital is crucial in today's age, as sustainable growth in the 2020s requires a major economic transformation, because simply restoring and maintaining the economic structure that existed before the crisis will not be sufficient. It will not be enough to merely increase the amount of capacities, special attention must be paid to qualitative aspects as well.

According to recent economic analyses, the success and permanence of convergence depends on the amount of investment as well as on its structure. The new technological revolution considerably improves efficiency and productivity via digitalisation and the collection and analysis of data (e.g. IoT). This results in a permanent competitive edge, and the enhanced efficiency resulting from digitalisation also has a positive environmental impact, promoting welfare in a sustainable manner.

The role of “smart” capital, i.e., **information and communication technologies** (ICT) and **intangible assets** (e.g. research and development, computer software and databases, licenses, organisational capital, know-how), has become more important. Development requires the coexistence of **assets** (ICT capital) and **software** as well as **organisational changes** (intangible capital). The beneficial effects of these reinforce each other: **their combined presence synergically increases efficiency** and the returns to scale of capital, thereby raising output and welfare.

“SMART” INVESTMENTS ON THE RISE

The largest portion of “smart” investments consists of investments in digitalisation. Digitalisation facilitates the optimisation of production processes and allows different consumer needs to be met quickly and flexibly, thereby increasing efficiency. Moreover, it also contributes to improving the skills of the workforce.

A significant share of the convergence resulting from the digital transformation can already be seen during the transition, as ICT capital is gradually building up. The transition of the capital structure permanently enhances efficiency and labour productivity, which stimulates GDP growth in the years ahead and also contributes to lifting wages. According to some calculations, in advanced economies, **investments in intangible assets accounted for 50 per cent of the rise in labour productivity in the private sector, as well as two-thirds of the GDP growth.**

Figure 7.3: Impact of the digital transformation on GDP growth

Source: MNB

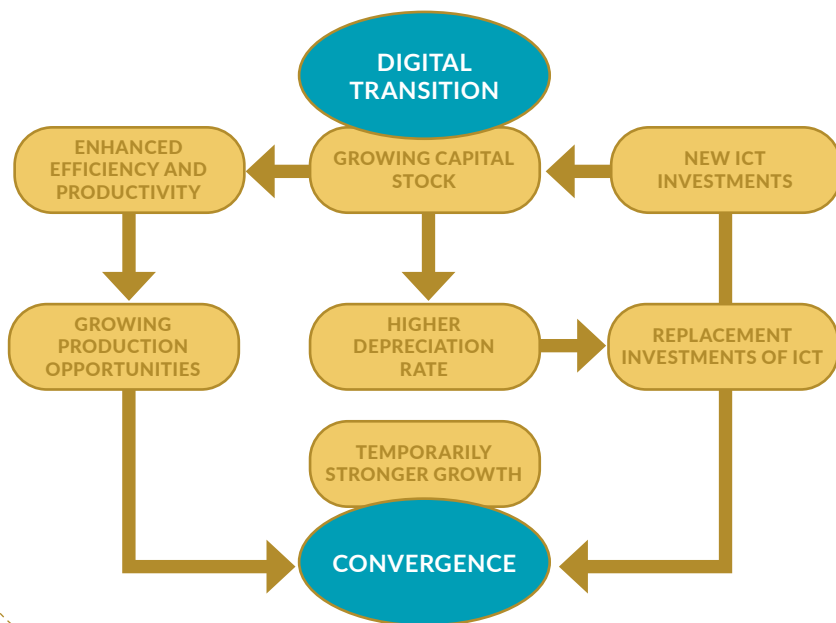
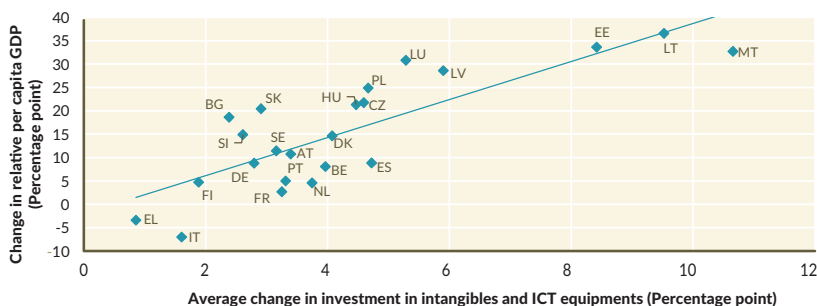


Figure 7.4: Relationship between changes in investments in intangible assets and ICT equipment, and change in relative development in the European Union (2000–2019)

Source: EUROSTAT, Penn World Table

Note: Relative level of development compared to the US. European Union countries excluding Ireland. Changes in investments between 2000 and 2018.



Since 2000, the advanced countries that enjoyed the most growth were clearly those where the rise in ICT capital played a fairly central role in the expansion of the capital stock. New Zealand, Sweden and Norway, where the ICT capital stock increased the most, converged to US GDP per capita by 6–12 percentage points. At the same time, the relative development of Italy and Japan declined by 7–9 percentage points, while ICT capital increased less. The example of Estonia, which has recently exhibited successful convergence, confirms the significance of digitalisation and “smart” capital in convergence. The promotion of economic development in Estonia was largely facilitated by its achievements in digitalisation, which had a profound impact in the corporate, household and public sectors. Estonia boasts a high level of digitalisation in public services. With the help of public support, e-governance was gradually developed, allowing the overwhelming majority of public administration services to be available online. Digital services also make the establishment and operation of companies easier.

In addition to improving competitiveness, widespread adoption of digitalisation can also improve an economy’s resilience. Widespread digitalisation can support economic performance even during crises, by enhancing competitiveness. Intangible capital goods proved to be more resilient during the Great Recession. While physical capital declined sharply and then recovered only slowly in the years after 2008, intangible capital diminished moderately in the US and Europe, too (Corrado et al., 2016). Additionally, more digitalisation may have also raised the performance of European Union countries (e.g. Nordic countries, Netherlands and Baltic states) in the year when the coronavirus crisis started.

WITHOUT DIGITAL TRANSFORMATION, DIGITAL DUALISM EMERGES

The advance of digital technologies allows companies to make digitalisation developments and investments to improve the efficiency of operation, production and sales. **Some companies spearhead these developments**, while others have not joined this process yet. This duality in the corporate sector is referred to as digital dualism. **Firms that fail to use these new technologies inevitably fall behind**, experiencing a competitive disadvantage in the market and becoming laggards.



The unequal rise in digital technologies has led to a slowdown in the aggregate productivity growth of the corporate sector in OECD countries (Andrews et al., 2016). **Since the start of the millennium, the difference between the productivity of highly productive and less productive businesses has been increasing** in ICT and non-ICT services as well. This divergence may have also been influenced by digitalisation, as less productive firms find it more difficult to attract the workforce necessary for the change.

Having the appropriate professionals is insufficient if the technological conditions are not right at companies due to the lack of “smart” investments; in other words, if their online presence, their own website, database usage, cloud computing and e-commerce are not up to par. The adoption of modern enterprise resource planning (ERP) software accelerates companies’ administrative, document management and process management systems. Using customer relationship management (CRM) software and monitoring partners, suppliers and customers helps to increase firms’ adaptive capacity. These lead to lasting improvements in productivity, raising welfare in a sustainable manner.

“Smart” capital stimulates the entire corporate sector. Since the start of the millennium, the difference between the productivity of highly productive and less productive businesses has been increasing in ICT and non-ICT services as well. In 2019, just 33 per cent of Hungarian companies were digital, while the average figure was 56 per cent in the top five EU countries (with an EU average of 40 per cent). This suggests that the Hungarian SME sector has a low digital awareness.

Reducing digital dualism is partly the task of regulators. According to experts at the OECD (2019), policies supporting a wide range of companies, such as establishing funding and regulatory systems and providing non-financial support, are necessary so that the digital transformation can increase productivity and thus also incomes. Nevertheless, sustainable development requires not only private developments, i.e. the use of big data and IoT, but also **ICT developments in the public sector, such as digital infrastructure, databases and education development.** Public digitalisation developments can provide a highly efficient framework for the economy, and they cannot be replaced with other factors of production.



DIGITAL
TRANSFORMATION

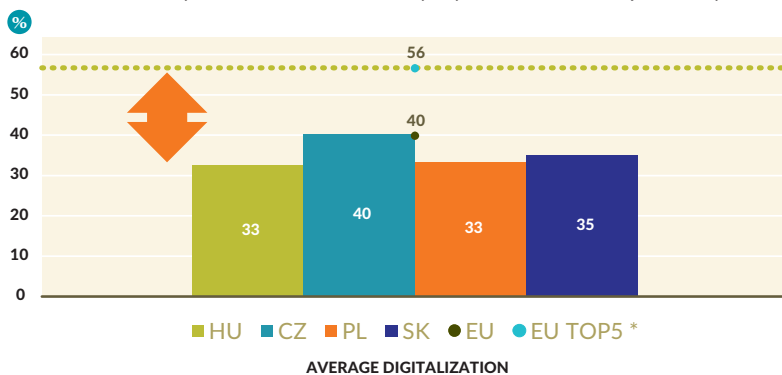


TECHNOLOGY
INCREASES
PRODUCTIVITY

Figure 7.5: Penetration of digitalisation among enterprises based on areas of digitalisation (2019)

Source: MNB based on Eurostat data

Note: Enterprises with more than 10 people. * Based on varying composition.



REFERENCES

- Andrews, D. – Criscuolo, C. – Gal, P. (2016): The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy, OECD Productivity Working Papers, No. 5
- Corrado et al. (2017): Advancements in measuring intangibles for European economies, EURONA (Eurostat Review on National Accounts and Macroeconomic Indicators), 2017/2
- Corrado, C. – Haskel, J. – Jona-Lasinio, C. – Iommi, M. (2016): Intangible investment in the EU and US before and since the Great Recession and its contribution to productivity growth, EIB Working Papers 2016/08, European Investment Bank
- MNB (2019): Growth Report
- MNB (2020): Productivity Report
- OECD (2019): Productivity Growth in the Digital Age.
- Roth, F. (2020): Revisiting Intangible Capital and Labour Productivity Growth, 2000-2015: Accounting for the Crisis and Economic Recovery in the EU, Hamburg Discussion Papers in International Economics, No. 3.
- Solow, R. (1960), Investment and technological progress. In: K. Arrow, S. Karlin and P. Suppes (eds.): *Mathematical Methods in Social Sciences* (1959), 89-104. Stanford University Press.
- Szabó, E. – Várnai, T. (2021): Az „okos” tőke szerepe a fejlődésben (The role of “smart” capital in development). MNB Article

ÁDÁM MARTONOSI

TECHNOLOGY

The law of increasing
returns may
become reality

“Exponentially expanding knowledge and technological revolutions are replacing the principle of diminishing returns.”

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



The technological innovations of the 21st century are dynamically transforming the entire world economy, with new industries emerging and others changing considerably. **Networking and digitalisation transcend earlier rules that seemed to form the rock-solid foundations of economics.** In the new industries, a small, most innovative share of companies have moved beyond diminishing returns, **reaching the law of increasing returns through the opportunities offered by technology and the accumulation of knowledge.** However, this successful period has only been temporary until now, as competitors can copy the products of every market leader or create close substitutes. This forces market leaders to continuously renew themselves to maintain their leading position, otherwise they will rejoin the companies operating in the traditional economy.

DESPITE TECHNOLOGICAL PROGRESS, PRODUCTIVITY GROWTH IS SLOWING DOWN

In the wide-ranging discussion of economic growth, technological progress and thus productivity growth enjoy a special place, by virtue of being the major factors in the sustainable growth of the future. However, there is an increasingly sharp contrast between the trends seen in advanced economies in recent decades and the positive visions achievable through technological progress. **By the 2010s, the growth rate of the European and American economies had contracted from 4 per cent typical in the middle of the past century to only 2 per cent.** This is mostly attributable to the slowdown in productivity growth, which dipped below 2 per cent in the 1990s, and continued to fall sharply in the middle of the 2000s (*Figure 8.1*).

The main question is whether the slowdown in productivity growth and the low growth seen in the past decades will characterise the decades to come, or the technological waves also referred to as the Fourth and Fifth Industrial Revolutions will open a new chapter in the world economy, and whether increasing returns will be reality in wider context. Nonetheless, the two scenarios may also be realised simultaneously, as **companies in the “traditional” economy will see diminishing returns**, hitting their natural barriers in market share and profitability, while **a smaller share of firms adopting innovations will be able to exploit the opportunities offered by increasing returns** as long, as they can, **thanks to their continuous utilisation of technology and knowledge.**

Figure 8.1: Average annual change in productivity

Source: Based on Bergeaud et al. (2016)

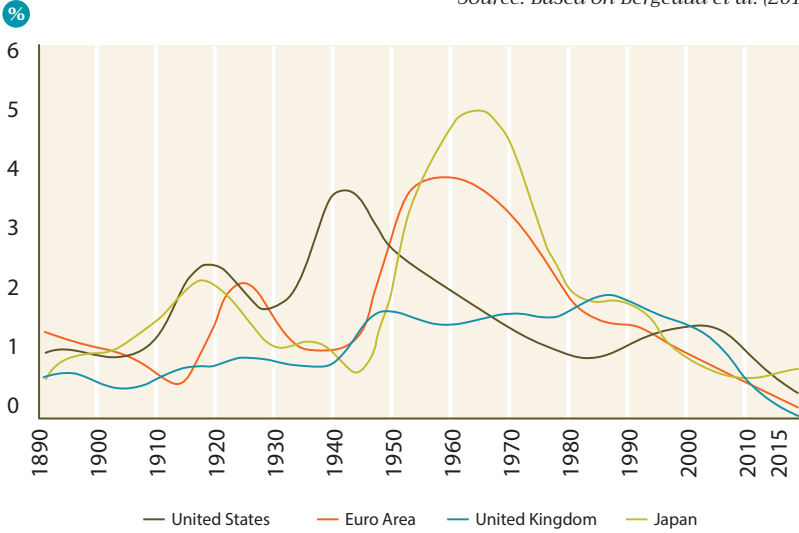
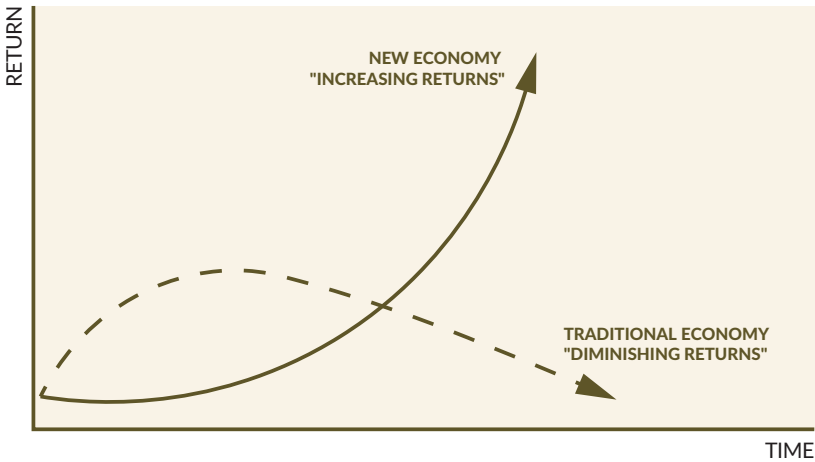


Figure 8.2: The old and the new economy: worlds of diminishing and increasing returns



N. BLOOM:
PRODUCTIVITY,
RESEARCH
AND NEW IDEAS

INCREASING RETURNS ACHIEVABLE IN THE NEW ECONOMY

Macroeconomics, and more broadly speaking economic thinking in the 20th century, offers little help in understanding how technological progress and the accumulation of knowledge are transforming the economy. The traditional segments of the economy are described accurately by economics. With minor shifts, Alfred Marshall's economic structure has been present in everyday life for over one hundred years. The changing environment, world trade and globalisation result in heightened competition, and technology progresses much more rapidly, but many industries still experience the principle of diminishing returns and mass production optimised in the context of low profits. **Alongside them, however, a small new group of companies has emerged, which seem to play by different rules.** In recent decades, companies such as IBM, Microsoft, Apple, Amazon, Facebook, and Tesla have been cropping up, and they have all used the law of increasing returns for a longer period. What differentiates the traditional economy from this new economy? (Figure 8.2).

Most companies face varying cost levels and profits during their life cycle, and they can use increasing returns for short periods, but later when the continued growth of the company or the production process itself hits some barrier, they start experiencing diminishing returns. The competitive, traditional economy is characterised by highly optimised mass production, combined with low profits.

However, increasing returns can be better utilised with less competition on the market, and therefore an oligopolistic or even monopolistic market structure is crucial. In today's globalised world and in the context of government regulations constraining monopolies and encouraging competition, such market dominance **can only be achieved temporarily if the company's product or service is new and revolutionary, allowing it to become a dominant force on its own in the industry.** This occurs mostly in industries where the introduction of new products is **preceded by thorough research and development, allowing that a new idea, technology, or innovation can guarantee success in the market and lead to increasing returns,** until rival firms can copy the development and enter the market with their own solution, thereby creating stronger competition. On the demand side, innovative businesses need consumers who are open to novelties and are able and willing to use new technologies. According to the diffusion theory of Everett Rogers, a large portion of society is particularly open to adopting innovations quickly, while most of society adjusts at a slower rate (Figure 8.3).

Figure 8.3: Adoption of innovations in society

Source: Based on Rogers (1962)

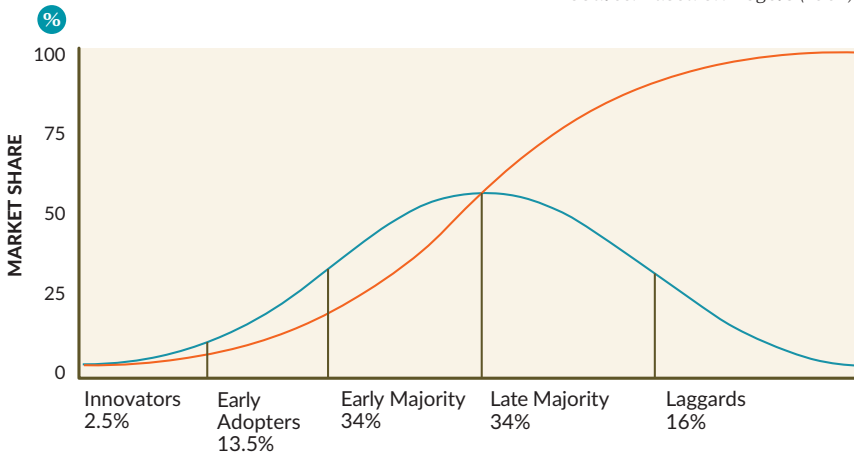
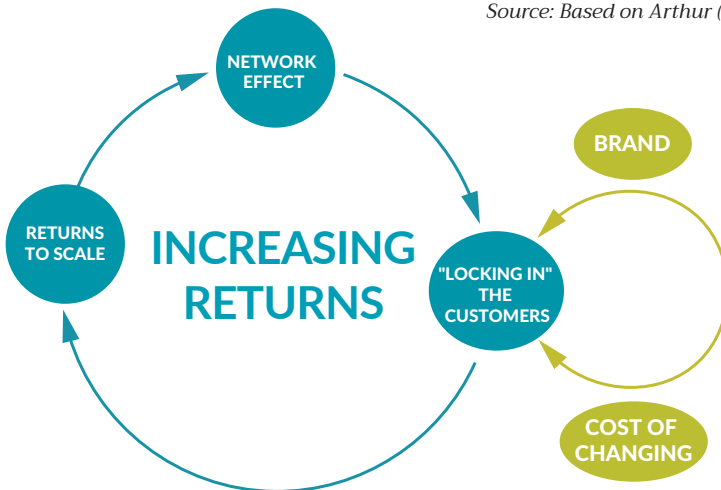


Figure 8.4: Increasing returns and „locking-in consumers”

Source: Based on Arthur (1996)



J. CLIFFORD:
RETURNS TO SCALE
IN THE ECONOMY

THE KEY TO SUCCESS IS INNOVATION, BRANDING AND USING NETWORK EFFECTS

Two different economic concepts coexist, with the economy engaged in traditional mass production and characterised by diminishing returns on the one side, and a small, innovative segment able to utilise increasing returns on the other side. Over time, competitors can copy the products of every market leader or create close substitutes. **This forces market leaders to continuously renew themselves to maintain their leading position;** otherwise, they will rejoin to the companies operating in the traditional economy.

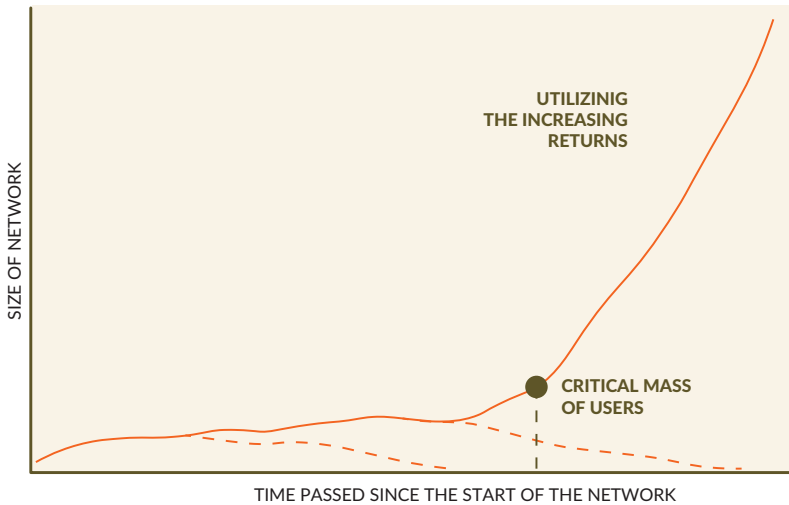
In addition to continuous innovation, companies use various techniques to retain their customers and generate as much profit from a good product as possible. Branding is nothing new, it is one of the most important marketing activities for companies.

The success of high-tech companies and the utilisation of increasing returns hinges not only on selling a successful product, but also on the effectiveness of the **whole businesses' ecosystem**. These companies are on a path followed by several similar firms which consciously build on these steps. This is because such products are markedly different from the products in traditional industries. Companies face high initial research and development costs, and consumers must also pay an entry cost and expect a learning curve, because using modern technologies often requires training and learning. When someone devotes time and resources to this, **to some extent they are bound to that technology** and the company producing it, as the entry costs would have to be paid again when switching to similar products of a competitor.

A good example for this is the current rivalry between Airbus and Boeing, the two dominant players in air travel. When an airline opts for the products of a manufacturer, huge sums must be spent on purchasing the aircraft as well as training pilots and the ground crew. After this if the same manufacturer markets a new airplane, the transition to that entails much smaller costs to the airline, as they are already familiar with the company's technology.

This channel is strengthened by organising products into a single ecosystem and utilising network effects. **This is because the firms operating in the high-tech sector do not market single products, but rather a whole range of products that are more or less related to each other.** When consumers purchase a smartphone, they can also buy a smartwatch, a laptop, a music player, a television and many other accessories. Thanks to joint development, the products can be paired easily and smoothly, and the related services further enhance the consumer experience (*Figure 8.4*).

Figure 8.5: Critical point in network effects




IN ADDITION TO CONTINUOUS INNOVATION, COMPANIES USE VARIOUS TECHNIQUES TO RETAIN THEIR CUSTOMERS AND GENERATE AS MUCH PROFIT FROM A SUCCESSFUL PRODUCT AS POSSIBLE.

Along with industrial sectors, network effects also appear in various services, especially nowadays in the digital world. For popular social networks and similar services based on the same principle, one way to succeed is to ensure that their user base expands to such a size where **critical mass is reached, and self-reinforcing network effects appear**. The law of increasing returns can also be utilised in such situations (*Figure 8.5*). Companies that have reached this point can become dominant players in the industry for some time. This was experienced by Facebook, Twitter, Instagram and many other businesses.

UTILISATION OF INCREASING RETURNS IS THE PRIVILEGE OF THE BEST AND MOST INNOVATIVE COMPANIES

The world based on the law of increasing returns has its own rules, which are not available to all companies. **Only firms that operate in sectors most affected by technological progress can break free from cut-throat market competition and become market leaders.** Technological innovation emerges in waves, and those who miss one can only follow market trends and wait for the next big thing for a long time. Conversely, those who were successful in a previous period may very well lose out in the next wave. Research and development is a risky business, where businesses undertake huge risks coupled with enormous costs. Those that come out on top dominate the market for years, but if they are unable to convert their efforts into a marketable product, the costly product development could spell their doom.



***NETWORK EFFECTS
ARE ESPECIALLY
IMPORTANT IN TODAY'S
DIGITAL WORLD.***

REFERENCES

- Artur, W. A. (1996): Increasing returns and the new world of business, *Harvard Business Review* 74 (4), 100-8.
- Bergeaud, A. – Cette, G. – Lecat, R. (2016): Productivity trends from 1890 to 2012 in advanced countries, *The Review of Income and Wealth* 62(3): 420-444.
- Growiec, J. (2018): The Digital Era, Viewed from a Perspective of Millennia of Economic Growth, *SGH KAE Working Papers Series Number: 2018/034*
- Jones, C. I. (1995): R&D-based Models of Economic Growth, *Journal of Political Economy*, 103, pp. 759-84.
- Marshall, A. (1980): *Principles of Economics*
- Rogers, E. M. (1962): *Diffusion of Innovations* (1st Ed.) New York: Free Press of Glencoe.
- Romer, P. (1990): Endogenous Technological Change, *Journal of Political Economy*, 1990, Vol. 98, Issue 5, S71-102.

Chapter 9

ANDRÁS BALOGH,
RÉKA MARGIT HAMVAI,
GÁBOR HORVÁTH,
ÁDÁM NYIKES,
GERGŐ TÖRÖK

MONEY

Central bank
digital currencies
change access
to money

*“The emerging digital
and sustainable economy
and society have created
the need for the money
of the new age.”*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



In the course of history, jumps in the evolution of money were triggered by the combined effect of three key factors: economic development, geopolitical changes and technological transformations. The emerging digital and sustainable economy and society have created the need for the money of the new age, and the three factors affecting the evolution of money are present in today's world at the same time. In response to this, the world's central banks are elaborating the concept of central bank digital currencies. Central bank digital currencies need to be sustainable from an economic, social and environmental perspective as well. The period between 2020 and 2050 will be about the revolution of money, along with the two main trends of the age, digitalisation and sustainability.

THE MONETARY SYSTEM DEVELOPS TOGETHER WITH GEOPOLITICAL, TECHNOLOGICAL AND ECONOMIC CHANGES

Money has been part of human history since its emergence and was often **an important factor shaping history as it transformed and evolved** (*Figure 9.1*). People first used commodity money based on social contracts and customs (such as grain in Mesopotamia). The first minted coins appeared in Lydia in 650–600 BC, and this was the first centrally regulated money. A similar innovation was the Chinese jiaozi, a predecessor to paper money.

The above examples already illustrate **the three factors shaping the evolution of money: geopolitical changes, technological transformations and economic development**. The truly large breakthroughs in the history of money occurred when these three factors were present at the same time in history..

MONEY HAS BECOME THE DRIVING FACTOR OF HISTORY SINCE ANCIENT TIMES

The functions of money (*Figure 9.2*) appeared in antiquity, and over time money became increasingly important internationally, searching for safe havens and looking to spread globally. It greased the wheels of economic discoveries and the shift in the centre of economic power in medieval Europe (*Figure 9.3*).

Figure 9.1: The development of money over the course of history

Source: MNB compilation

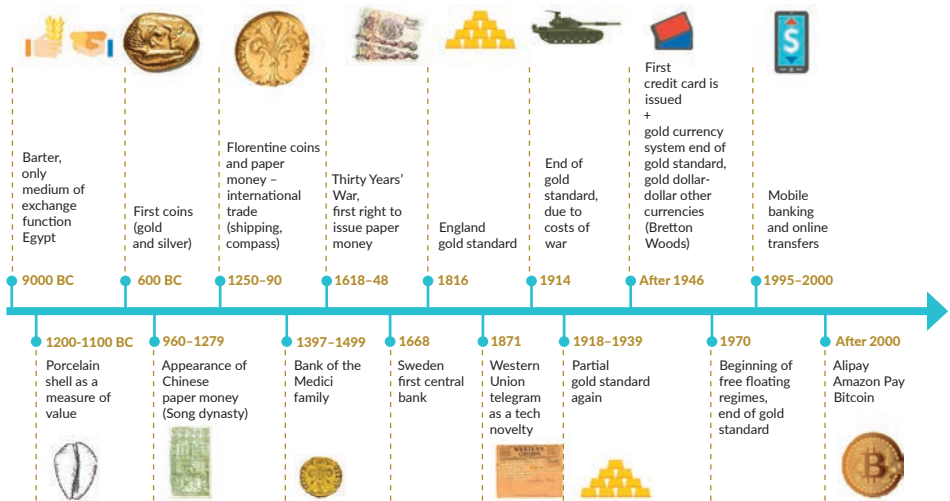
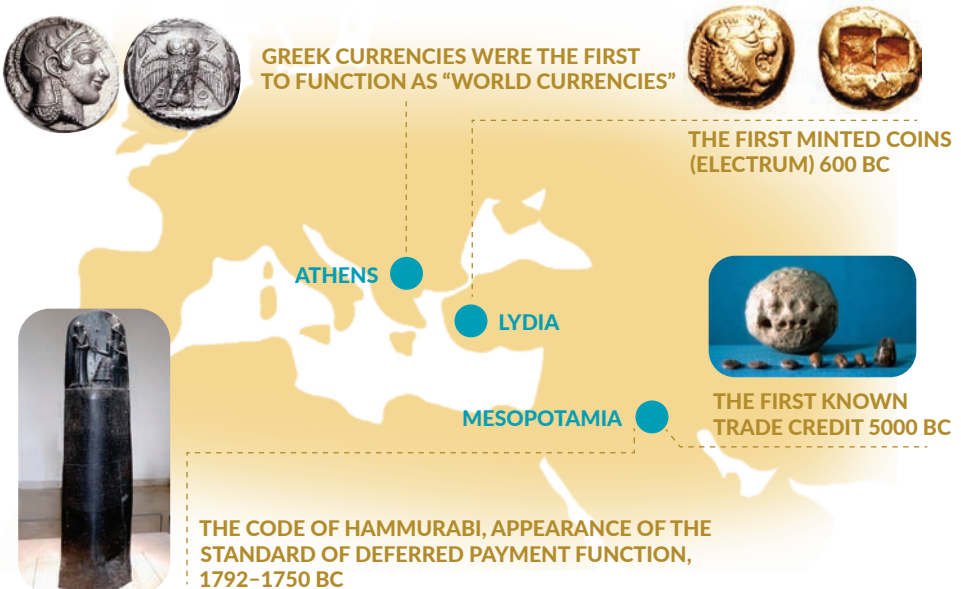


Figure 9.2: Emergence of the functions of money in antiquity

Source: Own compilation



AS CENTRAL BANKS APPEARED, THE STATE BECAME THE MOST IMPORTANT PLAYER TO ISSUE MONEY

The emergence of central banks and the monopolisation of money issuance are important milestones in the history of money: the first central banks appeared in the 17th century, when geopolitical and economic and social changes were afoot, and a technological transformation was also occurring. Central banks emerged differently in different countries (e.g. England, Sweden, USA), but ultimately the monopoly to issue money was secured by the state and central banks in most places. Thanks to digital progress in the past 50 years, electronic deposit money appeared, created by commercial banks in a decentralised manner. Based on the historical patterns, the next step in the evolution of money could be a centralised electronic currency, potentially realised in the form of central bank digital currencies (*Figure 9.4*).

The transformation of money is inevitable in today's age, and all three factors are present for this process. Geopolitical changes can be seen as the world is becoming multipolar, while economic changes and technological progress can be attributed to the green turnaround and increasing digitalisation. The challenges of the future may be overcome by the careful application of digitalisation, with the help of central bank digital currencies.

CENTRAL BANKS SHOULD SPEARHEAD THE DEVELOPMENT OF THE MONEY OF THE FUTURE

In the age of digitalisation, when cash use is on the decline and financial solutions circumventing the banking system (e.g. cryptocurrencies) are on the rise, central banks may lose one of their most important instruments, namely the form of money whose value they can guarantee and which can be used to enable economic transactions in the event of market failures. **The money issued by the central bank is still needed, but its form must be renewed to meet the expectations of the age, to provide a solution for economic challenges and to become widely adopted.** This can be solved with the concept of **central bank digital currencies (CBDCs)**.

Figure 9.3: Shift in Europe's geopolitical centre of power in the modern age

Source: Own compilation

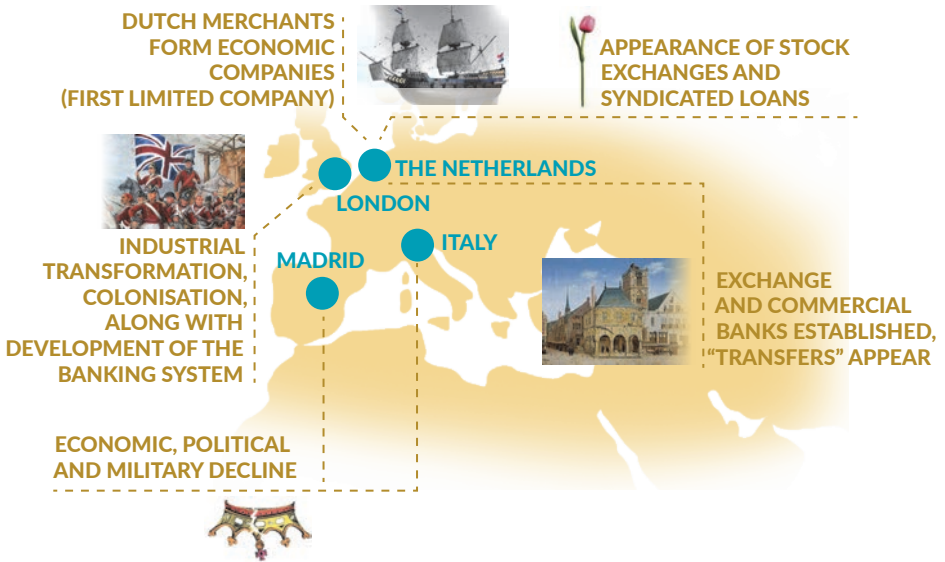
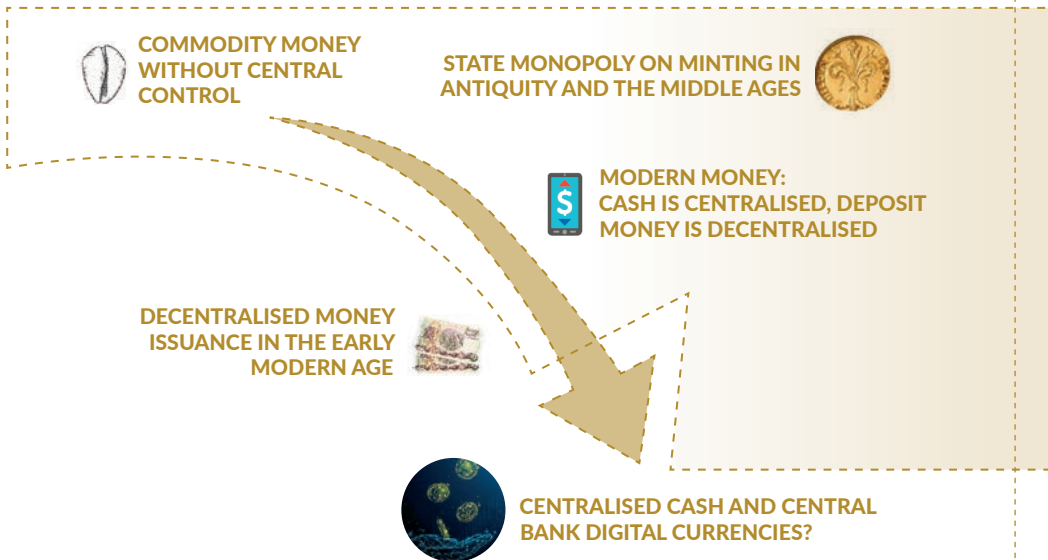


Figure 9.4: Evolution of the decentralised and centralised issuance of money

Source: Own compilation



CBDC can be defined as “**a digital form of central bank money that is different from balances in traditional reserve or settlement accounts**” (CPMI-MC, 2018). Based on the availability of CBDC, there are two main types: retail CBDC available to households and companies, and wholesale CBDC available to financial institutions. CBDC would appear alongside the current central bank money (cash and electronic central bank reserves), complementing the existing payment systems and facilitating the innovative solutions that can be derived from digitalisation.

While a few years ago central banks, financial institutions and other global organisations only researched central bank digital currencies theoretically, **the relevance of the concept is now proven by many pilot projects**. Today, a large portion of central banks are actively engaged in this field (*Figure 9.5*).

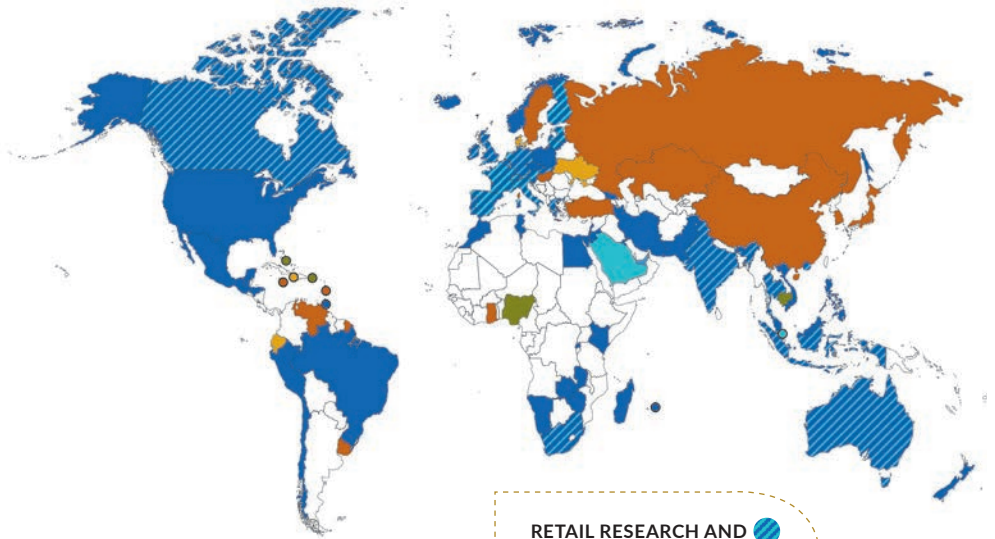
THE MAIN REQUIREMENT FOR THE MONEY OF THE FUTURE IS THAT IT SHOULD MEET THE NEEDS OF SOCIETY, THE ECONOMY AND SUSTAINABILITY

The newly emerging digital and sustainable society and economy has new expectations, and therefore the revolution of money is inevitable. Three conditions are necessary for the creation of a new currency that meets the needs of the digital and sustainable society and economy: it should **facilitate innovation**, strengthen **financial inclusion** and promote **sustainability** (*Figure 9.6*). Fulfilling these three conditions is necessary to ensure that the currency created is desirable for the digital and sustainable society and economy, offering a better solution than today. No one can foresee the innovations of the future, but three main directions can be identified in modern digital financial solutions:

- ▶ **Programmability**, an obvious example of which are the increasingly widespread smart contracts or artificial intelligence (AI)-based solutions.
- ▶ **Interlinkability**, which allows various (smart) devices to be linked and to communicate (e.g. IoT-based payments), thereby making their processes more efficient.
- ▶ **New approach to existing services**, through which solutions based on new business models can be developed that better meet user needs (e.g. micropayments).

Figure 9.5: World map of CBDC research and pilot projects

Source: Based on Auer et al. (2020),
CBDC Tracker and central bank websites, own work, 31/01/2022



Note:
In most cases, “ongoing retail pilot” means the testing of a technological solution with the involvement of market participants.

- RETAIL RESEARCH AND WHOLESALE PROJECT 
- RETAIL ACTIVE 
- RETAIL RESEARCH 
- ONGOING RETAIL PILOT 
- ENDED RETAIL PILOT 
- WHOLESALE PROJECT 

**86% OF CENTRAL BANKS PARTICIPATING
IN THE BIS SURVEY ARE NOW ACTIVELY
EXPLORING THE OPPORTUNITIES OFFERED
BY CBDCS, AND 14% ARE MOVING
FORWARD TO DEVELOPMENT
AND PILOT ARRANGEMENTS.**

BOAR-WEHRLI, 2021

Financial digitalisation can offer economical, efficient and user-friendly payment solutions, but not all social groups have the skills necessary for using modern technologies. The money of the future must be designed so that all social groups can use it for payment transactions anywhere and for free.

Currently, neither traditional financial systems nor the new forms of digital instruments that have appeared in recent years offer a solution satisfying all sustainability conditions. According to our sustainability requirement, **the environmental impact of the new financial system cannot be larger than today's.**

SNAPSHOT FROM 2050: HOW CENTRAL BANK DIGITAL CURRENCIES CAN CHANGE EVERYDAY LIFE

A hypothetical experiment will be conducted here to present a possible operating framework for central bank digital currencies in the economy through five major players.

Households: The CBDC is available to the public **for free**, regardless of financial situation and awareness, it is **secure** and it satisfies a wide range of user needs. The central bank digital currency, as **legal tender**, ensures the interoperability between emerging closed, isolated financial ecosystems.

Companies: Companies' efficient operation is facilitated by the fact that the CBDC has made the entire payment system **more cost-effective** and **faster**, especially when it comes to cross-border transactions. In addition, the use of **smart contracts** has automated several administrative processes related to trade, so resources can be focused on activities providing real added value.

Financial intermediaries: Banks and other financial service providers can base their **innovative** solutions on a reliable CBDC system. This ensures that financial innovation does not become monopolistic. Instead of closed, isolated ecosystems, an infrastructure **available** to everyone and used by households and companies can be utilised to develop new solutions. On the other hand, it increases **competition** in the payments market, thereby encouraging players to develop highly efficient and customer friendly services.

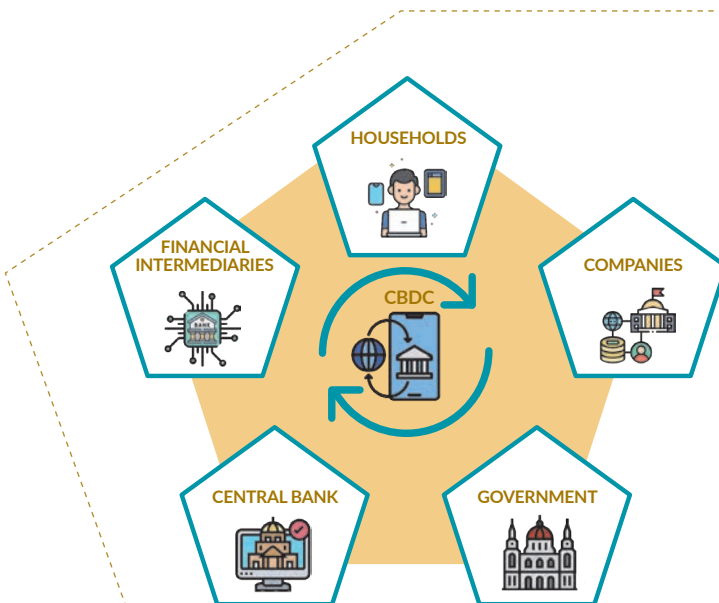
Figure 9.6: Three aspects of the money of the future

Source: Own compilation



Figure 9.7: The five main players of the CBDC framework

Source: Own compilation



Central bank: The central bank digital currency allows the central bank to maintain a **direct** connection to society in the digital era. Moreover, the CBDC ensures **monetary sovereignty** by resisting emerging alternative private and central bank (e.g. digital dollarisation) solutions. Depending on its design, the central bank can gain a new **programmable** monetary policy instrument and **transmission channel**, allowing it to give more effective and immediate response to economic turbulences and liquidity shocks.

General government: Appropriate design of the CBDC and the use of smart contracts make **government transfers and administration more efficient**. In times of crisis, the government can use **rapid, direct** fiscal transfers and support financial inclusion by reaching unbanked individuals.

It can be seen that central bank digital currencies would impact the operation and roles of the main economic actors. Therefore, the interests of all relevant actors in the economy need to be taken into account when designing CBDCs (*Figure 9.7*).

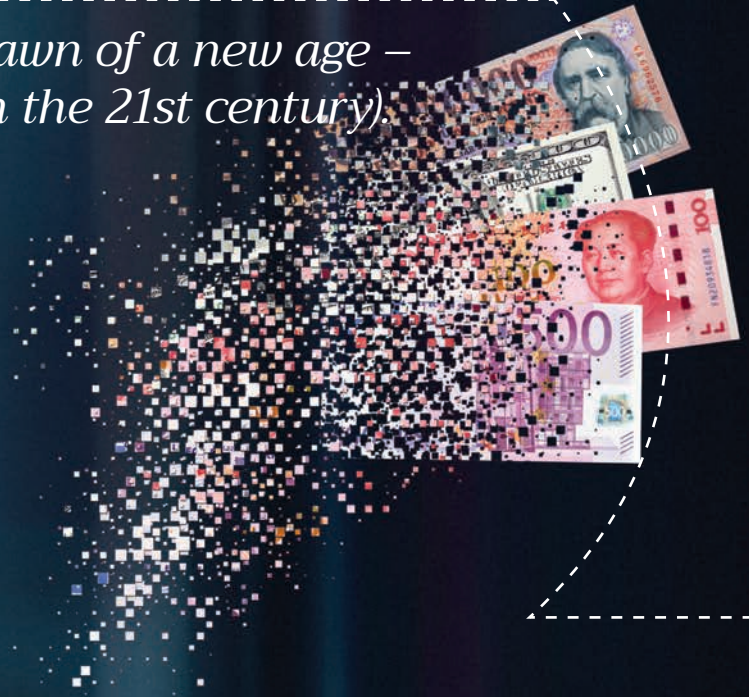
CENTRAL BANKS NEED TO LEAD THE CHANGE

It has become universally accepted that climate change also impacts the financial intermediary system. The situation is similar for central bank digital currencies: timing and early response are crucial. Central banks need to be at the forefront of the digital revolution and green transition. **In 2021, the MNB became the first European central bank with a green mandate.** In this spirit, the MNB has made it a strategic objective to ensure that the financial system facilitates environmental sustainability much more than today.



FOR MORE ON THE CONCEPT
OF DIGITAL CENTRAL BANK CURRENCY,
SEE MNB BOOK SERIES ENTITLED AT
*THE DAWN OF A NEW ERA -
MONEY IN THE 21ST CENTURY.*

*(At the dawn of a new age –
Money in the 21st century).*



***THE MNB INTENDS TO JOIN THE LEADING
CENTRAL BANKS IN THE FIELD OF CBDC
RESEARCH. IN JULY 2021, IT PUBLISHED
AN INTERNATIONALLY UNIQUE, COMPREHENSIVE
STUDY VOLUME THAT SUMMARISES
THE THEORETICAL CONSIDERATIONS
AND PRACTICAL ISSUES OF CBDCS,
AS WELL AS THE RELATED MOTIVATIONS
AND OPPORTUNITIES.***



REFERENCES

- Auer, R. – Cornelli, G. – Frost, J. (2020): Rise of the central bank digital currencies: drivers, approaches and technologies. BIS
- Boar, C. – Wehrli, A. (2021): Ready, steady, go? – Results of the third BIS survey on central bank digital currency (BIS Papers, No 114).
- Committee on Payments and Market Infrastructures (CPMI) (2018): Central bank digital currencies. Bank for International Settlements.

BÁLINT DANCSIK,
ÁRON DRABANCZ,
MÁRTON EL-MEOUCH NEDIM,
KOPPÁNY NAGY,
RICHÁRD BENSE,
LÁSZLÓ TÖRÖK,
ANDRÁS G. SZABÓ

NEW AND SUSTAINABLE
FORMS OF FINANCING
THE ECONOMY
Advantages and dilemmas

*“A varied, balanced and widely
available funding structure
can pave the way for Hungary’s
continued convergence.”*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



External financing improves the development opportunities of economic actors, as their investments and plans can be implemented earlier and on a greater scale than if they had to do so using only their own funds. Nevertheless, it is essential that the **funding is sustainable**. In this chapter, this does not necessarily refer to the achievement of “green” objectives, but rather to a financial aspect, i.e. that economic actors should have continuous access to external funding without any major volatility, in the funding structure they are used to or what they are aiming for. In this context, the main objectives are that the funding opportunities be appropriately **diversified** and **targeted**; therefore, strengthening the Hungarian **capital market** is vital. Secondly, with respect to the rise in fintech/Big Tech funding, a balance must be struck between **efficiency** and the **protection of personal data**. Thirdly, there should be appropriate consistency between **financial inclusion** and financial stability. The role of **institutional investors** (insurers, pension funds, fund managers), which crucial for sustainable economic development, is becoming more and more significant, as they typically collect small household savings and manage those for a long time, generating a steady and continuous demand for Hungarian stocks and government securities and thereby directly financing government debt and economic growth.

LET'S BE DIVERSIFIED IN TERMS OF FUNDING ALSO

In order to pave the way for long-term growth, it is especially important to finance new technologies, in particular green objectives. According to a study by the IMF (2015), in any given country the development of financial institutions produces greater value added at lower levels of development, while the development of financial markets does so at higher levels of development. In addition, it can be empirically observed that, in relation to financial deepening, there is a discrepancy between financial stability and economic development. Generally, during the implementation of a sustainable financial system, any financial deepening that is too fast, too wide in scope or not diversified enough entails risks (*Figure 10.1*).

Figure 10.1: Estimated link between funding structure and systemic risk

Source: Bats - Houben (2020)

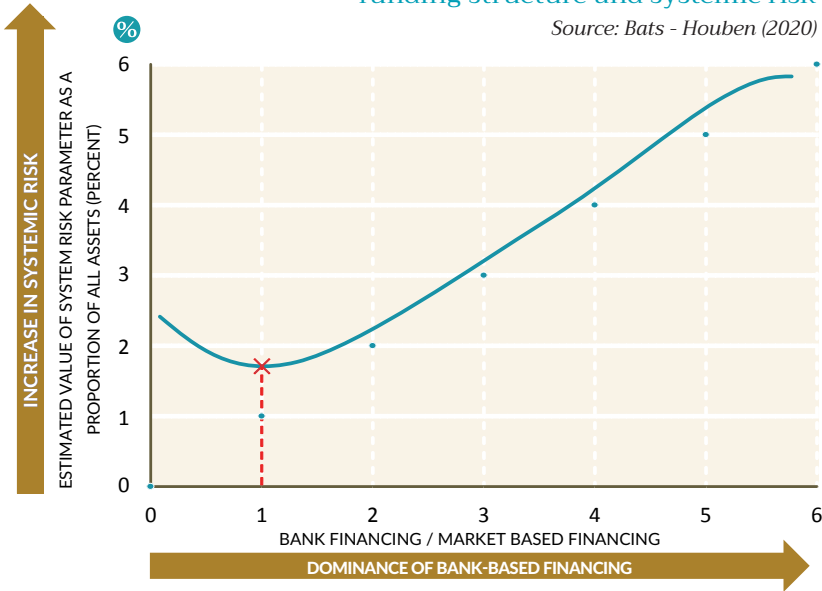
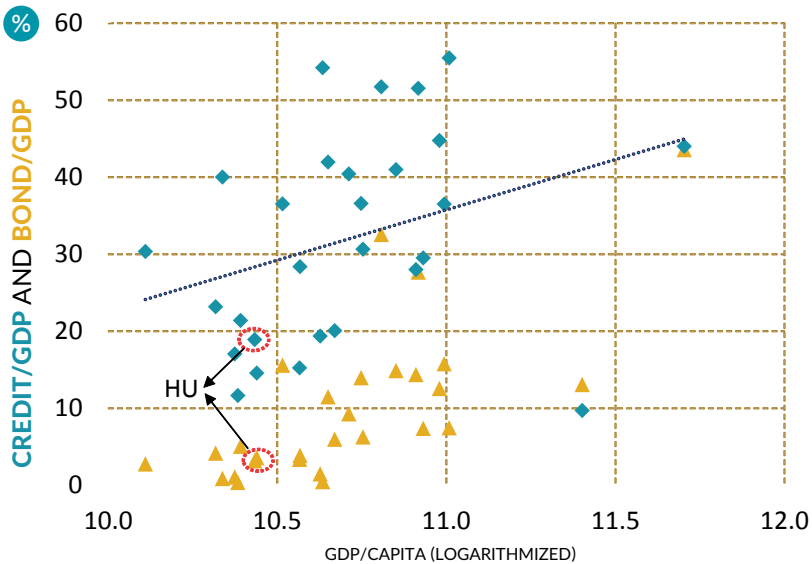


Figure 10.2: Bank loans outstanding and bond holdings of non-financial corporations relative to GDP, as a function of GDP per capita, in an international comparison

Source: Eurostat, OECD, ECB



It is of particular importance in the field of **corporate borrowing**, that the different **sub-markets** enabling borrowing **expand** in a balanced, sustainable manner, complementing **each other**. In the Central and Eastern European region, there is ample scope for expanding both the credit market and the capital market (*Figure 10.2*). Furthermore, **the share of capital market financing is very low across Europe** relative to Anglo-Saxon countries. In Hungary, the share of bond market and equity market financing is higher than in other Central and Eastern European countries (*Figure 10.3*), but further progress should be made relative to GDP to establish a funding structure that is more sustainable from the perspective of systemic risk. Moreover, **young companies should be supported with new methods**: in addition to venture capital investments, solutions such as incubation, crowdfunding and peer-to-peer lending can open up new channels in bolstering innovation in Hungary. A liquid corporate bond market and other innovative financial approaches would help increase healthy competition between the markets providing funding to companies, and the central bank's interest rate decisions would be transmitted more effectively in the future. Moreover, when it comes from various sources, financing strengthens firms' resilience and financial stability.



JUST BE SMART WITH NEW TECHNOLOGIES

In addition to traditional financial intermediaries, new, innovative players have emerged in the intermediary market in the past few years. These players typically conduct their activities through online platforms, with a data-driven approach. Although for now fintech and Big Tech firms do not play a significant role in lending globally, they have secured an increasing share in financial intermediation in certain regions. **According to estimates, in 2019 fintech loans of USD 223 billion and Big Tech loans of USD 572 billion were disbursed globally.** In the course of their activities, fintech, and especially Big Tech companies, have more information about customers, which gives them an advantage that can be exploited vis-à-vis traditional, incumbent banks. While credit assessment is typically based on formalised, appropriately substantiated documentation (e.g. proof of income, negative data from the Central Credit Information System) collected with the loan application in the case of the “old” intermediaries, the new players often have huge, albeit often unstructured, datasets (*Figure 10.4*). However, the development of technological and analytical tools does not always entail advantages

Figure 10.3: Distribution of the funding sources in some European countries

Source: Eurostat, OECD, ECB (2021)

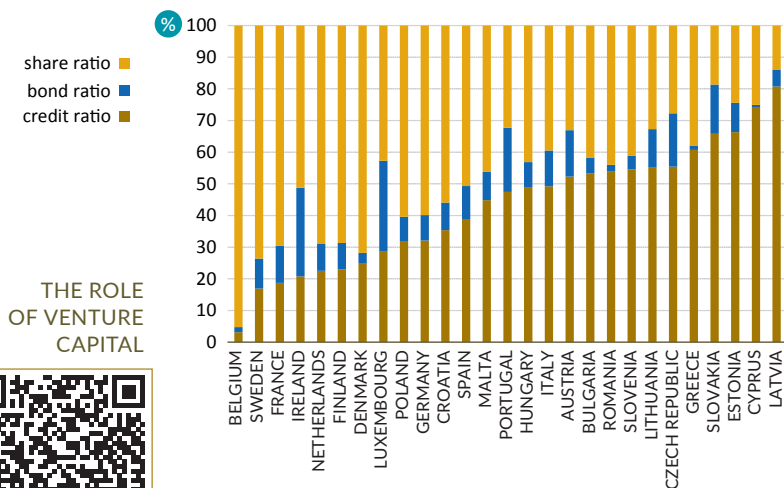
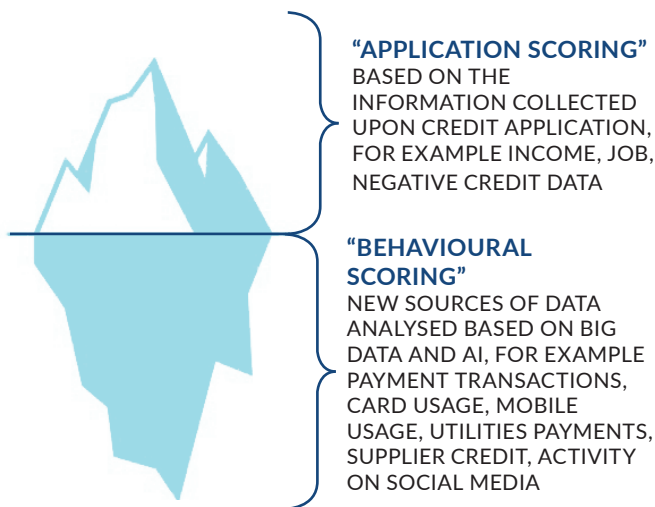


Figure 10.4: Different sources of traditional and innovative credit risk estimation

Source: Eurostat, OECD, ECB



One major dilemma involves the point where efficiency should be constrained: **which pieces of data should be available to financial institutions, and which should remain private.**

Along with digitalisation, the European Union has experienced a large wave of branch closings in the past 10–15 years (*Figure 10.5*), and banks have sought to divert customers towards online channels. While branch closings cut costs, they also entail a decline in financial inclusion, as the availability of physically accessible financial services diminishes. With respect to the rise in online solutions, however, **people's financial and technological awareness should be strengthened**, as failing that the utilisation levels of these channels can be limited.

DOMESTIC SAVINGS ARE NEEDED FOR SUSTAINABLE GROWTH

A general prerequisite for economic development is a substantial rise in and correct structure of capital accumulation. A precondition for dynamic economic growth is a high investment rate, which can be increased by boosting domestic savings. Along with direct government securities purchases and bank deposits, household savings basically appear in the financing of the economy via institutional investors. Their share has been increasing in the past two decades, as **globally the financial instruments of institutional investors increased more than banks' financial assets in the past few years.** Among institutional investors, insurers and pension funds are the most actively engaged in channelling the small savings of customers into the economy in an aggregate form, and these resources would not necessarily end up in the economy without this process. The example of European countries shows a marked correlation between economic development and savings (*Figure 10.6*). On the other hand, this causality is also true in reverse: in other words, the amount of savings has a positive impact on economic development by financing the economy using government securities, equity and bond investments. Therefore, increasing the coverage of pension savings programmes is a social policy objective, necessitated by demographic motives and the aforementioned economic policy objectives.

Figure 10.5: Change in the number of bank branches in European Union Member States, 2008–2019

Source: Based on ECB (2021), own compilation

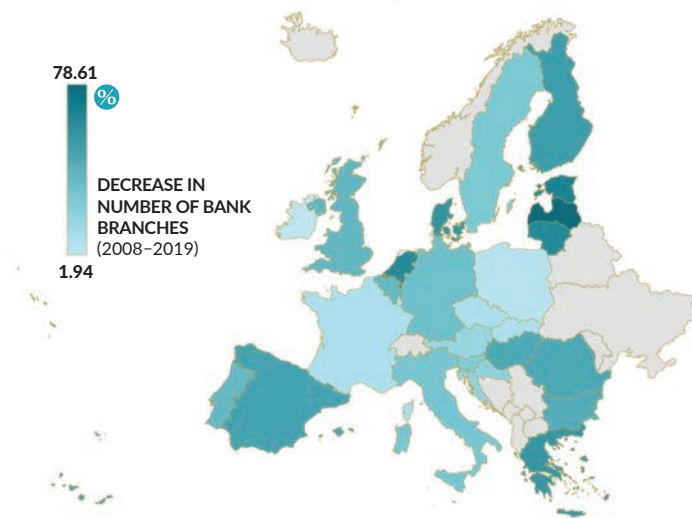
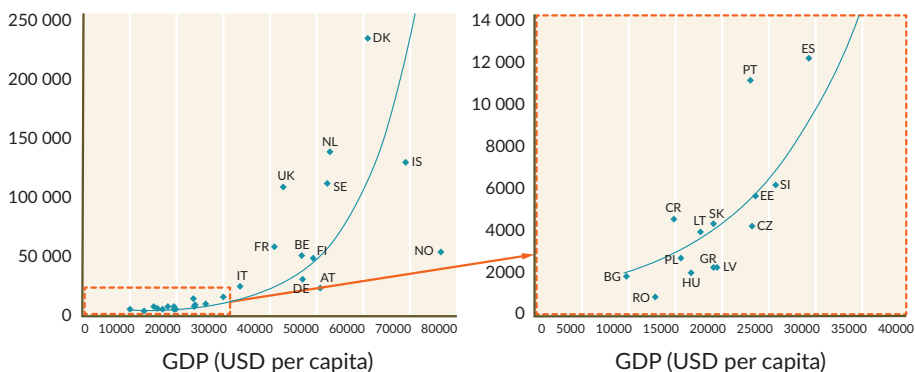


Figure 10.6: Relationship between supplementary pension and life insurance reserves and GDP levels (2019)

Source: Eurostat



THE RISKS OF
ARTIFICIAL
INTELLIGENCE



COMPETITIVENESS
PROGRAMME IN
330 POINTS

As long-term institutional investors and due to their customers' geographical and currency preferences, **insurers and pension funds can provide stable financing to the economy.** The large-scale domestic investment of savings can be promoted by the establishment of regulatory and incentive schemes aimed at this, but they can only achieve a marked effect with broad coverage and high penetration. To this end, countries use various long-term (typically pension) savings incentive solutions, such as tax allowances, direct state supplements (a fixed amount or one based on payments), limiting investment costs, special institutional government securities and auto-enrolment with an opt out option. After compulsory participation, the OECD believes that the next most effective way to increase penetration is auto-enrolment (with an opt out option), and that is what it recommends. Richard H. Thaler formulated the default choice effect, and applying this effect to pension supplement schemes, Thaler and Benartzi described the so-called SMarT programme. In essence, people rarely deviate from the default option, because they trust it and deviation requires active participation and an individual decision. Therefore, **auto-enrolment and appropriately chosen default options can considerably increase the savings rate**, without making people feel that they are incurring a loss.

The differences between pension supplement and life insurance reserves are caused by social traditions and the features of economic development. Western European countries have huge reserves amounting to multiple times their own GDP, in contrast to Central and Eastern European countries where there was no large institutional investor sector prior to the economic transformation in the 1990s. In the short run, the amounts removed from current consumption flow into financing the economy, thereby contributing to sustainable development and exerting a countercyclical effect that reduces inflation.

A basic precondition for a welfare turnaround is a high household (domestic) savings rate, and with that the growing size of the Hungarian institutional investor sector can produce positive effects for Hungary. This can be implemented, for example, through the continued development and introduction of the welfare fund concept proposed by the MNB, which would enable the achievement of greater and permanent coverage in a short time, based on the already existing voluntary fund system supplemented with auto-enrolment. As a result, the countercyclical, disinflationary effect can take hold in the years following introduction. In the sector subject to Hungarian regulation, the accumulated savings could be guided, and the investment of the reserves could provide a continuous demand for financing the domestic capital market and government debt.



**DIVERSIFIED
FINANCIAL
SYSTEM**



**BALANCED FUNDING
STRUCTURE**

**ACCESSIBLE
AND SECURE
ONLINE
BANKING**



REFERENCES

- Arcand, J.-L. – Berkes, E. – Panizza, U. (2012): Too Much Finance? IMF Working Paper, No. 12/161
- Bats, J. V. – Houben, A. C. F. J. (2020): Bank-based versus market-based financing: Implications for systemic risk, *Journal of Banking & Finance*, Vol. 114, May 2020, 105776
- Benartzi, S. – Thaler, R. H. (2004): Save More Tomorrow™: Using Behavioral Economics to Increase Employee Saving, *Journal of Political Economy*, Vol. 112, No. 1 (Feb. 2004), pp. 164-187
- IMF (2015): Rethinking Financial Deepening: Stability and Growth in Emerging Markets, IMF Staff Discussion Note, May 2015.
- King, R. G. – Levine, R. (1993a): Finance, entrepreneurship, and growth – Theory and evidence, *Journal of Monetary Economics*, Vol. 32, No. 3 (Dec., 1993), pp. 513-542
- OECD (2022): OECD Roadmap for the Good Design of Defined Contribution Retirement Savings Plans
- Magyar Nemzeti Bank (2019): Competitiveness Programme in 330 Points

KATALIN JUHÁSZ

THE NECESSITY OF A GREEN TURNAROUND IN THEORY AND PRACTICE

Our past, present
and future resources

*“We do not inherit the Earth
from our ancestors: we borrow
it from our grandchildren.”*

*David Bower,
environmental activist*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



Can we continue our current lifestyle? This question arises when one thinks about how long the planet's natural resources will last while satisfying an ever growing humanity's basic needs and its desires beyond that. **Earlier economic theories did not take into account the extent to which production exploits the environment's resources.** At best, the environment appeared in past production functions in the form of available land. Exploitation of these limited resources can have irreversible and fatal consequences for all humanity, and therefore earlier economic models and theories do not apply anymore. **In the new economics, these should be replaced by incentives and regulations that shift global production and consumption in a more sustainable direction, and by new accounting methods that take into consideration the previously disregarded negative externalities when calculating economic costs.**

NEW GUIDING PRINCIPLES ARE NEEDED IN THE ECONOMY AND DECISION-MAKING TO PRESERVE LIFE ON EARTH

Pollution arising from economic production and other human activities impacts all inhabitants of Earth, even those who did not actively contribute to it. In other words, pollution is a **negative externality**. In economics, negative externalities are **costs or negative consequences that affect someone other than the producer**: for example, pollution from factories impacts every member of society, leading to extra costs for society as a whole. Until recently, environmental pollution has not been a focus, but then people started to gain first-hand experience about its negative side effects. The economic attitude needs to change to manage these negative externalities at the individual and social level.

Nowadays, one of the best known organisations seeking to measure sustainability refers to the environment's available resources as **biocapacity**. According to the interpretation of the Global Footprint Network, biocapacity can be considered the supply side of nature, while people's **ecological footprint** is the demand for nature (Figure 11.1).

For more than 50 years now, humanity has been using more natural resources each year than the Earth's capacity to regenerate them. At the current consumption rate, people use more than 1.7 Earths' worth of resources every year (Figure 11.2). ◀

Figure 11.1: Interpreting the ecological footprint

Source: Based on Global Footprint Network

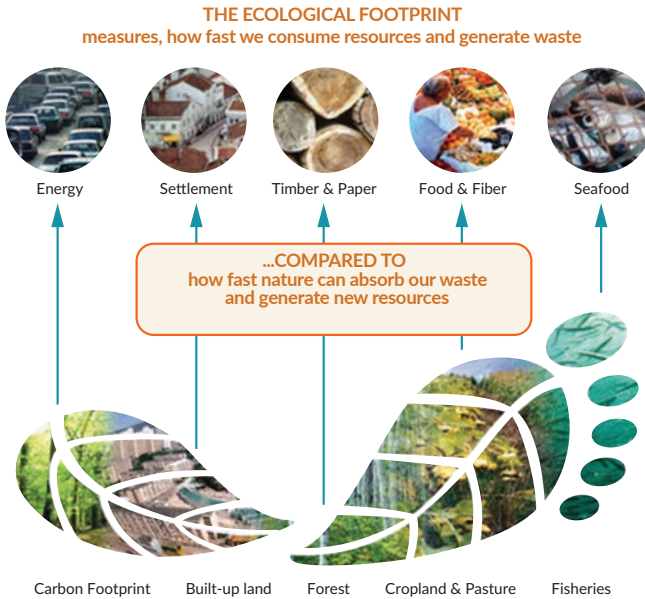
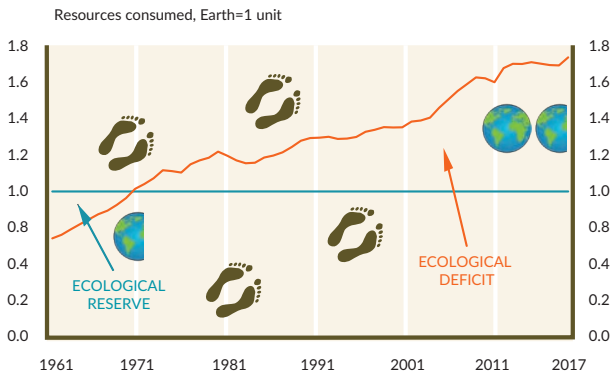


Figure 11.2: Change of the ecological footprint of the world population

Source: Global Footprint Network



- The maximum available ecological capacity (biocapacity) of the Earth
- Natural resources used by the global population
- The unit of measurement is based on how many Earths would be needed to satisfy all needs.

HISTORY IS THE TEACHER OF LIFE – LET US PAY ATTENTION TO IT IF IT WARNS US TO PROTECT OUR RESOURCES

In the history of humanity, the modern age is not the only time when the overuse of resources led to fatal consequences. During the period of the Roman Empire, on the Easter Island and in the age of 19th-century industrialisation no balance was struck between a prosperous economy and the resulting damage to the environment, in the end the people of these civilisations paid the price with their health or even their lives.

In the **Roman Empire**, the development of urbanisation, the gigantic construction projects (e.g. Hadrian's Wall in Britannia, Figure 11.3), the establishment of new agricultural areas, large-scale warship building and wars led to the destruction of forests due to increasing logging. The **forests were soon replaced by swamps**, which attracted mosquitoes and became a hotbed for malaria.

Another famous example is the **Easter Island** in the Pacific Ocean, known for its monumental statues, where the indigenous population lived in peace for more than a millennium. Over the centuries, shipbuilding requiring timber and fishing on the open seas increased, while agriculture also expanded. Due to the soil erosion triggered by **deforestation, freshwater resources dried up, the opportunities for agriculture diminished**, the last large indigenous species went extinct, and food also became scarce (Múlt-kor, 2020). The various groups living on the island started fighting for the limited resources (Fenley and Bahn, 2006), destroying their civilisation's legacy and statues. By 1868 not a single statue remained standing, and just as they fell, so too did the native society of the island.

Finally, **the Industrial Revolution profoundly changed the relationship between humanity and the environment forever.** As cities became increasingly crowded, the air, water and the streets also became more and more polluted due to industrial activities. Poor air quality, the lack of sunshine and malnutrition, coupled with epidemics and hereditary and gradually developing diseases decimated society. Besides pulmonary diseases, another common ailment in cities was rickets. The problem persisted during the subsequent waves of the Industrial Revolution: the **Great Smog of London** caused the death of thousands of people and the illness of many more in 1952.

THESE HISTORICAL
EVENTS ACCELERATE
CLIMATE CHANGE



Figure 11.3: Hadrian's Wall, designed as a line of defence (World Heritage Site)

Source: Wikipedia



Figure 11.4: By 1840, Manchester had become one of the first industrial cities in the world

Source: Wikipedia. Available at: <https://en.wikipedia.org/wiki/File:Cottonopolis1.jpg>



The historical examples are eerily reminiscent of today's environmental problems such as deforestation and increased air pollution. The lesson to be learnt here is that although revolutionary innovations and technological advancement are needed today, as they (can) lead to progress, this has to point towards sustainable development, which can only be achieved through a **balance between humanity and nature**.

HUMANITY FEELS THE CONSEQUENCES OF CLIMATE CHANGE FIRST-HAND TODAY

Due to the expected negative effects of global warming, several studies are sounding the alarm, and rightly so, as more and more of these effects can already be felt, such as extreme heatwaves, floods and the continuously shrinking polar ice caps. **The decade between 2011 and 2020 was the hottest decade of all time**, and within that in 2020 the global temperature was 1.2 °C higher than in pre-industrial times (1850–1900), and it was 2.2 °C higher on average in Europe. Compared to the average between 1981 and 2010, almost 13 per cent of the polar ice cap is lost each decade. If the entire Greenland ice cap melts, sea levels could rise by about 6 metres, which could submerge entire cities (WWF, 2019).

Persistent warming entails fatal dangers (*Figure 11.5*):

- ▶ loss of productivity and growing death rate due to **heat stress**,
- ▶ continued **desertification** and growing incidence of natural disasters,
- ▶ agricultural land becoming **infertile**,
- ▶ sea and ocean shores becoming **uninhabitable** and **submerged**
- ▶ increasing **water shortages**,
- ▶ wars and **migration** to secure scarce resources.

Around two-thirds of the greenhouse gases causing or exacerbating global warming are released into the air from the fossil fuels that people burn. In 2018, 8.7 million people died because of air pollution caused by the burning of fossil fuels (Vohra et al., 2021), while in East Asia 30 per cent of deaths were linked to this factor (*Figure 11.6*).



DO WE NEED
NUCLEAR ENERGY
TO STOP CLIMATE
CHANGE?

Figure 11.5: Consequences of climate change

Source: *The Economics of Climate Change, an analysis by the Swiss Re Institute (2021)*,
background: Iberdrola (2021) and own compilation

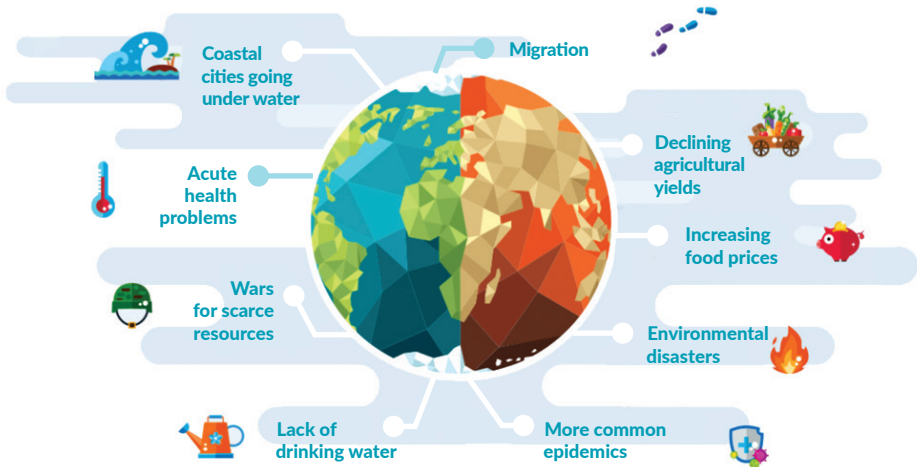
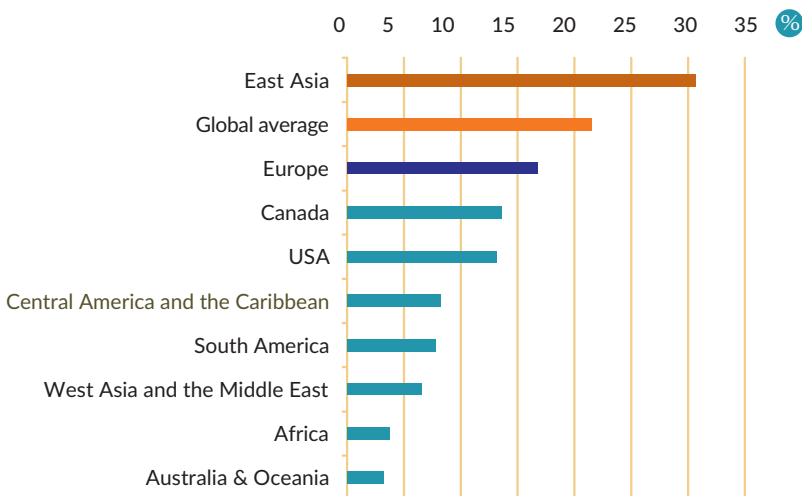


Figure 11.6: Share of deaths due to fossil fuel air pollution within total deaths

Source: Vohra et al., 2021

Number of deaths resulting from exposure to fine particles produced through burning fossil fuels (PM_{2.5}) among those aged 14 and older.



ENVIRONMENTAL SUSTAINABILITY MUST BE APPLIED IN ECONOMIC THEORY AND PRACTICE AS WELL

Historical examples show that moderation in the coexistence with nature is vital for society's survival. Our knowledge available today about climate change helps identify historical parallels. By learning from the past and recognising today's challenges, the aspects of environmental sustainability should be incorporated into growth models. In decision-making practice, besides punitive measures and constraints, positive incentives encouraging a green transition should also be included (**sticks and carrots**).

Punitive measures and constraints of economic policies include various **green taxes**, typically levied on production activities entailing carbon dioxide emissions, thereby incorporating the polluting effect into the price of production. Another tax-type measure is the EU's emission trading system (ETS), in which companies can trade with the permitted emission quotas. Environmental charges may also be useful incentives, as they directly tax businesses' polluting activities and raise the costs for damaging the environment. One may also mention the taxation of landfill as well as deposit charges (on PET bottles, glasses and metal containers), which are payable by the consumer in contrast to the above examples.

The incentives of economic policy may comprise **subsidies and preferential loan schemes** that can encourage investment processes pointing towards green growth. In Hungary, positive examples on the fiscal side include the high share of green government bonds, which exceeds the EU average (MNB, 2021), and which may provide extra funding for several green projects. From a monetary policy perspective, **the Magyar Nemzeti Bank's activities are exemplary. It was the first central bank in Europe to have a green mandate**, and it supports the financial system and thus also the climate-friendly transition of the entire economy.

There is no consensus on the correct way to address climate change, but many things can be done for the green turnaround individually. Living a frugal lifestyle that reduces the ecological footprint can generate strong demand for companies' climate-friendly products. In addition, decision-makers can also be expected to employ the demonstrably most efficient sustainability strategies.

**“THE FUTURE OF ALL LIFE
ON THIS PLANET DEPENDS
ON OUR WILLINGNESS
TO TAKE ACTION NOW.**

**MANY INDIVIDUALS ARE DOING
WHAT THEY CAN.
BUT REAL SUCCESS CAN ONLY COME
IF THERE IS A CHANGE IN
OUR SOCIETIES AND IN OUR
ECONOMICS AND IN OUR POLITICS.”**

(SIR DAVID ATTENBOROUGH)



GREENFINANCE



It must be underlined that there is no set of green measures solving all environmental problems, addressing the climate crisis and reshaping or halting continuous overconsumption at the same time. If people want to take effective action against climate change, fundamental changes are required in the global social, political and economic system, and **we cannot rely on technological solutions alone** (Tapaszti, 2021). In the decades to come, positive and negative environmental incentives will not only make the economy greener, but will also **guarantee competitiveness and sustainability**, two concepts that have become inseparable, through the realised investments and technological innovations.

REFERENCES

- British Petrol (2021): Statistical Review of World Energy 2021.
- Climatewatch (2021): World Greenhouse Gas Emissions in 2018 by Sector, End Use and Gases.
- Flenley, J. – Bahn, P. (2016): A Húsvét-sziget rejtélye (The Enigmas of Easter Island). Translated by: I. Janáky, Budapest: General Press (29 August 2006). ISBN 963 9598 82 8.
- Global Footprint Network. (2021): Country Trend – World.
- Grüll, T. (2017): A Római Birodalom gazdasága (The Economy of the Roman Empire). Gondolat Kiadó, Budapest. ISSN 1788-9553.
- Guo, J. – Kubli, D. and Saner, P. (2021): The economics of climate change: no action not an option. Swiss Re Management Ltd, Zürich.
- Iberdrola (2021): Social and economic impact of climate change. <https://www.iberdrola.com/sustainability/impacts-of-climate-change>
- Magyar Nemzeti Bank (2021): Sustainability Report. Magyar Nemzeti Bank, Budapest.
- Múlt-kor (2020): Máiig szolgálnak megoldatlan rejtélyekkel a Húsvét-sziget óriásszobrai és ökológiai katasztrófája (To this day, the giant Easter Island statues and ecological disaster remain an unsolved mystery).
- Nriagu, J. O. (1983): Lead and Lead Poisoning in Antiquity. New York, John Wiley & Sons.
- Tapaszti, A. (2021): 10 gondolat a klímacélokról, negatív emissziós megoldásokról, karbonmegszorításokról és a technológiai megváltásról (10 thoughts about climate objectives, negative emission solutions, carbon cuts and technological implementation). Ecomomania Blog.
- Vohra, K. – Vodonos, A. – Schwartz, J. – Marais, E. – Sulprizio, M. and Mickley, L. (2021): Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from geos-chem. Environmental Research, 195.
- WWF (2019): Six ways loss of Arctic ice impacts everyone.

GÁBOR IZSÁK,
ALEXANDR PALICZ,
KATINKA SZÁSZ,
BALÁZS VARGA

DATA

The new oil, the latest factor of production

*“The successful digitalisation of the
economy requires a data-driven
turnaround in all sectors.”*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



The unprecedented amount of data available due to technological progress in recent decades allows for outstanding improvements in efficiency, which, however, requires state engagement addressing the related risks. Owing to the data-driven nature of the financial sector, improvement of the sector's data access can serve as a pilot project that could facilitate the development of the economy as a whole.

DUE TO TECHNOLOGICAL PROGRESS, DATA HAS BECOME CRUCIAL IN VALUE CREATION

Datasets are now key in production processes, but they differ from other production factors in several respects. **Unlike capital and labour, information is not finite; it is available in continuously increasing quantities,** and when consumed it is not used up but may produce more information. Data can be easily copied and transferred, but are difficult to reproduce when damaged or destroyed. Since data are retained even after being used, they can be stolen without being lost.

The development of IT technologies in recent decades has led to an exponential expansion of global data assets. Nowadays, the amount of data generated on the internet each minute comprises around 200 million emails, 69 million online messages, online purchases worth USD 1.6 million and hundreds of hours of videos uploaded. **This has ushered in the so called big data era, in which data are available in such quantities and are so complex that they cannot be processed with the previously used tools.** The value-creating capacity of the available information arises from its use in decision-making and its ability to improve efficiency. Therefore, the value-creating capacity of the data assets can be maximised by ensuring regulated access to them.

Launching a data-driven economy would generate significant economic and social gains in various areas. If the data assets were utilised, 50,000–200,000 lives could be saved in the EU each year thanks to faster emergency services and fewer road accidents. If transportation networks were optimised, 27 million working hours and pollution amounting to 5.8 million tonnes of oil equivalent could be saved. The financial sector has especially great potential, as its operation is based on the highly accurate use of data available on customers. Therefore, annual GDP could be raised by 1.5 per cent if the data access of this sector was improved (Kaufman et al., 2021).

Figure 12.1: Differences between data and traditional factors of production

Source: Based on DAMA (2017), own compilation



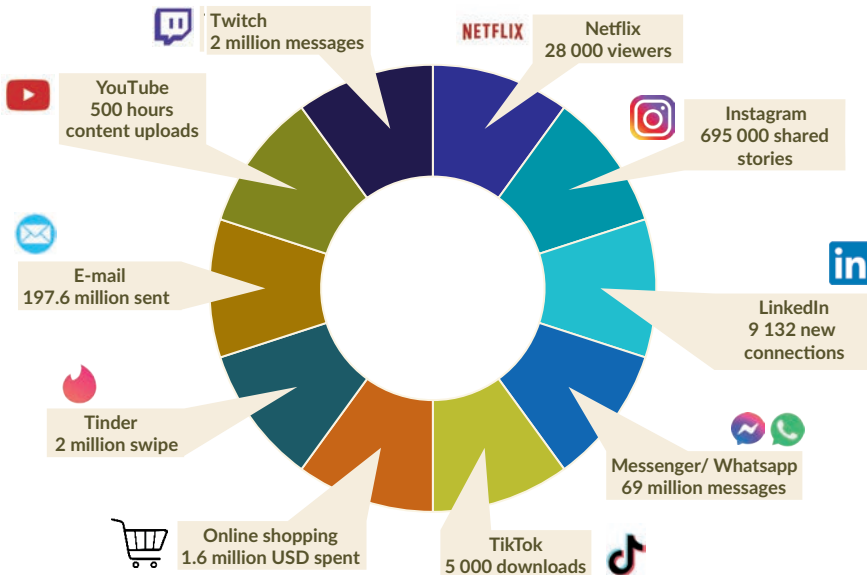
	 Traditional factors of production (capital, labor)	 Data
Global volume	Finite, slowly growing	Exponentially-growing
Application	Amortises upon usage	No amortisation upon usage, new data may even be generated
Transport	Not as mobile, difficult to transport	Fast and free to be moved
Reproduction, repairation	Mostly easy to reproduce and repair	Difficult to reproduce
Security	Security incidents (theft, damage) appear quickly	Can be stolen without disappearing. Rapidly growing data assets also pose an increasing data security risk.
Accounting	Appears in the balance sheet (capital)	It is only partially shown in the balance sheet, but its value can be significant

Figure 12.2: Volume of data per minute on the internet in 2021

Source: Statista



Nevertheless, a transition to a data-driven economy could also entail several challenges:

Data protection: Data market rights and responsibilities are unclear, their control is fraught with challenges, which can lead to excessive data collection and distrust among users. On the other hand, overly strict data protection regulations can constrain the use of data assets and innovation.

Data monopolies: In order to maintain their competitive edge, companies with significant data assets and states often behaving as data monopolies restrict access to data assets.

Cybersecurity: Data collecting institutions often neglect the protection of the IT infrastructure and the avoidance of potential data leaks, which undermines confidence in the digital infrastructure.

International cooperation: Without international cooperation in data collection and sharing, there is a risk that global data markets become fragmented and isolated pockets of data only loosely connected to each other could emerge.

Social relations: The rise in digital communication reduces personal interactions. This excludes social groups without digital competencies and leaves them vulnerable to crime.

Economic restructuring: Digitalisation entails a transformation of the labour market. As labour demand in rising sectors increases, demand for jobs in easily automated positions could wane.

THE STATE MUST PLAY A LEADING ROLE IN ESTABLISHING A DATA-DRIVEN ECONOMY AND IN SUPPORTING ITS OPERATION

Creation of national data strategy and regulatory framework: The state should create a data strategy and a related regulatory framework, harmonising them with various policy development plans and ensuring their consistent implementation.

Data management and data protection regulation: The establishment of a data-driven economy requires the creation and implementation of data and business secret protection rules that ensure that data is mainly controlled by those to whom they pertain, but do not constrain the utilisation of the economic potential in data.

Figure 12.3: Online access to data in Europe

Source: EU Open Data Portal

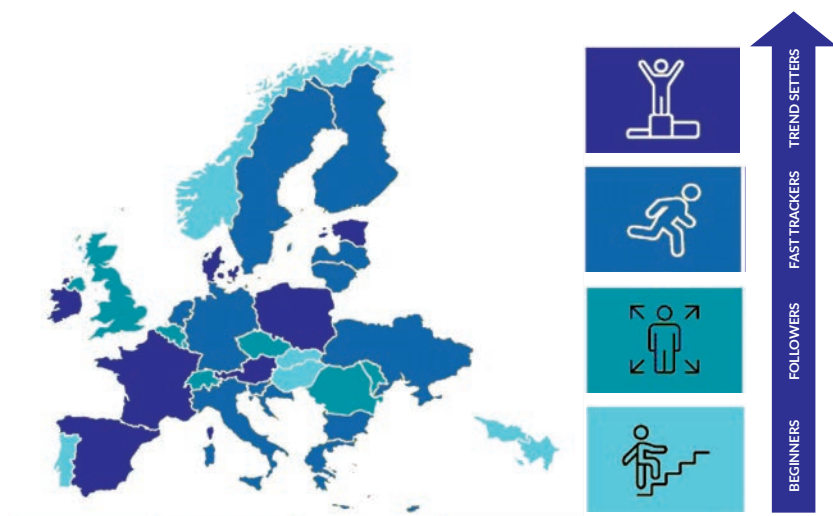
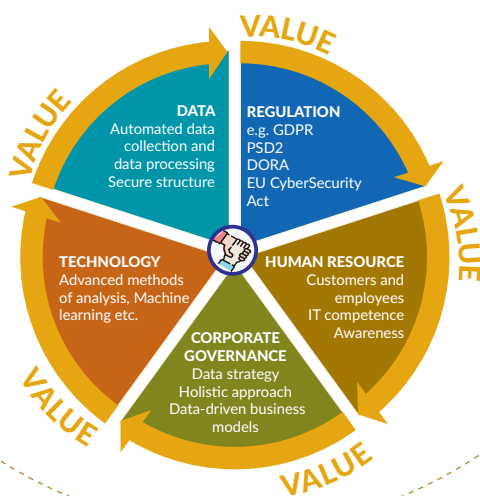


Figure 12.4: Areas necessary for a successful digital economic restructuring

Source: BDV (2020)



Ensuring access to data on a level playing field: The state should strive to ensure broad, automated, up-to-date and electronic access to public and market data assets by economic actors on a level playing field.

Establishment of a data-driven public institutional system and expertise: The government should strive to establish an open, data- and service-driven, transparent and result-oriented public institutional system, which requires a comprehensive change in attitude from a digitalisation perspective.

Proactive, data-driven transformation and operation of public services: In the case of public services such as public administration, education and healthcare, the state must play a leading role in establishing data-driven operation, while in the case of services controlled by the private sector the state should assume a licensing and supporting position.

Provision of a broad, secure infrastructure: The state's digital policies should rest on ensuring that the internet and other basic digital systems are universally accessible, affordable and secure.

Development of human and organisational competencies to foster innovation: The state's responsibility is to narrow the digital gap between the digitally literate and digitally less conscious social groups (OECD, 2019).

MARKET PARTICIPANTS SHOULD ALSO TAKE STEPS FOR A SUCCESSFUL DIGITAL TRANSFORMATION

Progress in digitalisation may open up new markets for companies, but it can also lead to a transformation of the market, the appearance of new competitors or the shrinking, or even disappearance, of certain product markets (OECD, 2020). Therefore, businesses should focus on six areas to ensure a successful data-driven transition:

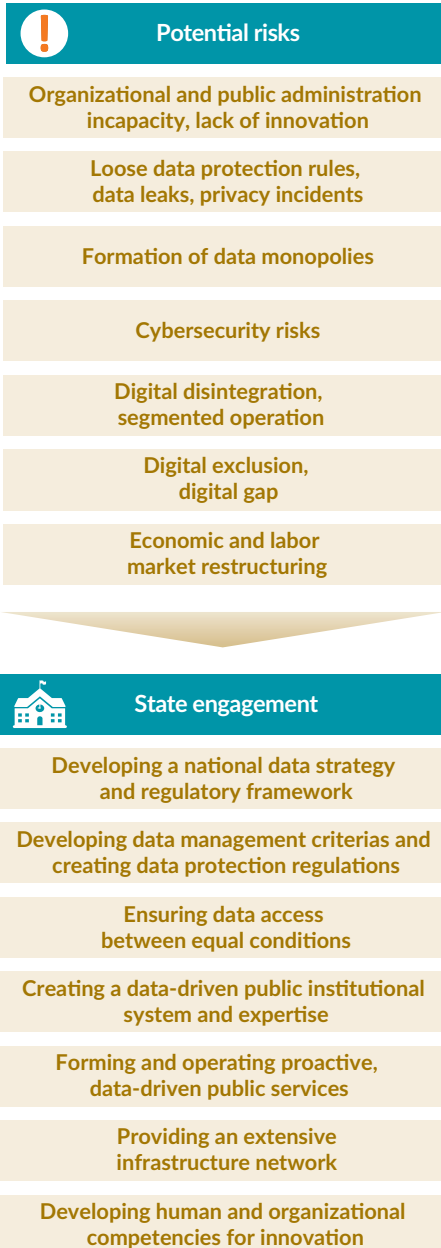
Digital strategy: Establishment of a digital strategy aligned with long-run market trends, available to the entire organisation and presenting the long-term digital objectives of the company and the objective indicators measuring them.

Organisational structure: The most efficient way to complete digital restructuring is by creating a dedicated digital competence centre identifying digitalisation opportunities, acting as an initiator and coordinator, and being responsible for securing a position in the digital ecosystem outside the company.



Figure 12.5: Cornerstones of launching a public data economy

Source: MNB (2021)



ESTONIA IS
THE ONLINE STATE



Innovation and research: The recognition and implementation of the opportunities offered by data assets requires continuous innovation and the launching of pilot projects. Therefore, it has become standard practice at the most innovative firms to create a group responsible for product development (e.g. Google[X], Amazon Lab126, Volkswagen Automotive Innovation Lab, McKinsey Digital Labs, etc.).

Talent development: A data-driven transition also requires special expertise. In order to engage business analysts, software developers, cybersecurity experts and engineers well versed in database management procedures and data analysis algorithms, companies need to have attractive incentive schemes in place and continuously improve the skills of the existing workforce.

Inclusion of the ecosystem: The development of the digital ecosystem is of special importance, as instead of technologies designed in-house, the role of partnerships facilitating cooperation with suppliers and competitors and focusing on innovation is becoming the norm.

Awareness-raising: The forced maintenance of less efficient business processes and refusal to take part in changes on the market may lead to a loss of competitiveness. Therefore, awareness-raising within organisations and focusing on utilisation of the data assets is crucial.

SOCIETY NEEDS TO COME TOGETHER TO LAUNCH A DATA-DRIVEN ECONOMY

Data represent one of the cornerstones of modern economies' competitiveness, but the utilisation of the available data assets could be developed in several areas, which requires state engagement and society to come together. The state has a special role in ensuring that the databases that are currently fragmented and difficult to access are transformed into an open, regulated, competitively neutral and market-friendly data centre by devising regulatory policies aligned with market needs.

Successful digitalisation of the economy also calls for the development of society's digital skills, which requires cooperation between the state and the market. The state can facilitate the development of digital competencies through its public education, higher education and adult education policies, while market participants can do so through their educational strategy and by cooperating with public educational institutions.

THE RISE
OF ARTIFICIAL
INTELLIGENCE



OPPORTUNITIES
OFFERED BY OPEN
ACCESS TO DATA



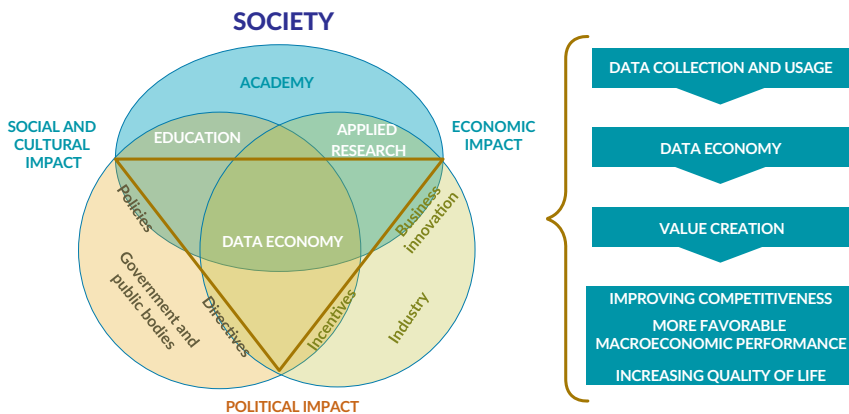
Figure 12.6: Focal points in the successful digital transformation of corporations

Source: McKinsey (2018)



Figure 12.7:
A holistic approach to launching a digital economy

Source: OECD (2020)



The financial system is an especially data-driven industry, as its operation is based on data analysis, and it utilises a huge amount of existing data assets that can be potentially used. Therefore, the improvement of access to data in this sector can serve as a pilot project for digitalisation reforms, and it can have a positive effect on the economy, offering useful lessons about making headway in other segments as well. For example, much progress could be made by simplifying creditors' access to credit history and income data, ensuring access to the energy-efficiency data of residential properties used as collateral, creating a central appraisal database simplifying appraisal processes and digitalising processes in the Land Registry.

REFERENCES

- BDV (2020): Towards a European-Governed Data Sharing Space, Big Data Value Association, 2020.
- DAMA (2017): DAMA-DMBOK: Data management body of knowledge. Technics Publications, LLC.
- Kaufman, S. – Madgavkar, A. – Manyika, J. – Olanrewaju, T. – Sibanda, T. – Townsend, Z. – White, O. (2021): Financial data unbound: The value of open data for individuals and institutions, McKinsey.
- McKinsey (2018): A blueprint for successful digital transformations for automotive suppliers.
- OECD (2020): Implications of the Digital Transformation for the Business Sector, Organisation for Economic Cooperation and Development), 2020.
- WEF (2020): The Future of Jobs Report 2020, World Economic Forum, 2020.

DÁNIEL BABOS

TRUST

A precondition
for complexity and
networking

*“I think the next century will be the
century of complexity.”*

Stephen Hawking (2000)

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



In the 21st century, technological progress has reached the point where the economy and society are becoming a complex, adaptive system. The number of connections and interactions has steadily increased, and the system has become more and more complex. It is especially important to ensure that there is **trust** between economic actors interacting with each other, **as trust is the basis for establishing relations**. However, there are global megatrends that lead to a loss of confidence and polarisation: the growing income inequalities, the rise of fake news and the heightened fears all undermine trust in the economic system. One of the challenges of the 21st century will be to halt these unfavourable developments so that confidence between economic actors can be rebuilt. **A necessary condition for sustainable development is the existence of trust and the establishment of a complex system**. The economic decision-makers need to act proactively to answer the questions that people in the 20th century were unable to. Overcoming these challenges requires broad cooperation within society and creation of a social contract that points the way forward for economic actors, encourages innovation and strengthens social cohesion.

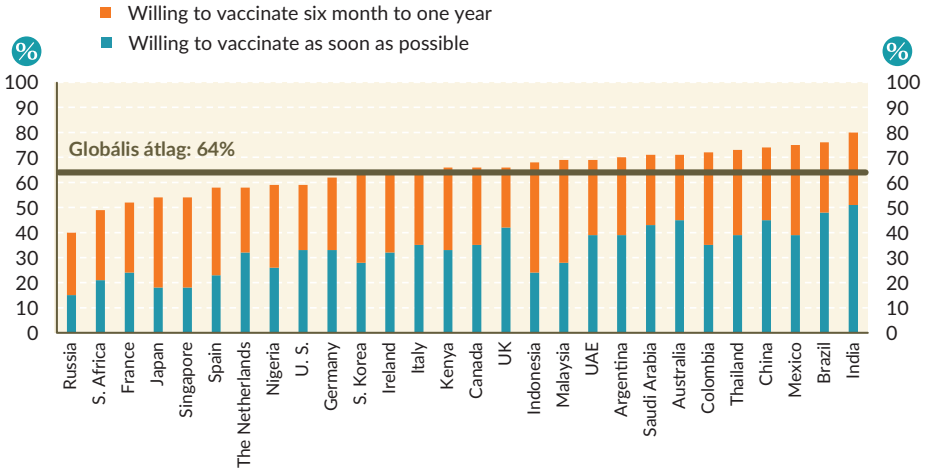
LINKS AND TRUST ARE IMPORTANT IN COMPLEX SYSTEMS

The world economy is now based on an unprecedented amount of cooperation and interactions between actors located close to, or even quite far away from, each other. People get a first-hand experience how an armed conflict can increase the price of energy and even less keenly observed products such as nickel and palladium, and they see how this increases transport and wait times, something which the consumer society has become unaccustomed to in recent decades.

The rain forests, companies, societies, human immune systems, the internet and the globalising world economy are all parts of a complex and adaptive system. They all develop and adjust to the environment where they operate. In order to survive, the entire system has to adapt. In recent years, scientists have identified several basic features and principles that determine how complex physical, biological and social systems are organised and how they operate and develop. As a result, the accumulated knowledge about complex systems is being integrated across disciplines. **Complexity as a discipline brings about a fundamental change in world views from healthcare and international politics to urban planning.** Studying complexity distances researchers from linear thinking and a mechanistic world view, pointing out **non-linear** dynamics, **evolutionary** development and **systemic thinking**. ←

Figure 13.1:
Acceptance of Covid-19 vaccines in 28 countries in the world

Source: Edelman Trust Barometer 2021



“THE RAIN FORESTS, COMPANIES, SOCIETIES, HUMAN IMMUNE SYSTEMS, THE INTERNET AND THE GLOBALISING WORLD ECONOMY ARE ALL PARTS OF A COMPLEX AND ADAPTIVE SYSTEM. THEY ALL DEVELOP AND ADJUST TO THE ENVIRONMENT WHERE THEY OPERATE.”



COMPLEX SYSTEMS

If the participants of complex systems are human, a precondition for operating such systems is the existence of trust between the participants. In day-to-day life, people continuously act as parts of a complex system. Such systems include our jobs, traffic and, more broadly speaking, the operation of the economy as a whole. The operation of these systems requires trust between the autonomous participants, because without that the number of interactions would decline and the system would collapse. One of the best examples for this is the current basis for the financial system, fiat money, which has no intrinsic value. In such a case, the value of money and the operation of the system depends solely on the trust in the system.

During the global health and economic crisis of 2020, the value of trust in the state and science became more important than before. The Covid-19 crisis posed an unprecedented challenge to decision-makers, who had to implement measures that were basically unheard of in normal times. The success and acceptance of the measures in 2020 and ultimately the fact that the virus was kept at bay were strongly influenced by the extent to which the public trusted decision-makers.

COMPLEXITY AS THE DOMINANT PARADIGM OF THE 21ST CENTURY

Rzevski (2015) defined complexity as follows: “Complexity is a property of open systems that consist of a large number of diverse, interacting components.” He argued that complex systems are distinguished from other systems by seven important factors: **connectivity, the autonomy of agents, emergent behaviour, nonequilibrium, nonlinearity, self-organisation** and **co-evolution**. He believes that societies approached complex systems step by step. The author claims that human history can be divided into three stages. In agricultural societies, the main resource was land, and local roads provided the basis for trade and connections. The success of societies and communities was basically determined by hard work. By contrast, in industrial societies capital was the key resource, and the success factor was the economy of scale.

In the information society, the economic system became increasingly complex as the number of connections expanded. According to Rzevski, after the Second World War, the transition from industrial societies to information societies started with the increasingly widespread use of computers. The development of digital technologies also sharply increased the complexity of society.

Figure 13.2: Features of complex systems

Source: Rzeuski (2015)



Table 13.1: Joint evolution of technology and society

Source: Rzeuski (2015)

SOCIAL STAGES	KEY RESOURCES	DISTRIBUTION	SCOPE	SUCCESS FACTORS
Information society (digital technology)	Knowledge	digital networks	global	adaptability
Industrial society (mass production)	Capital	railways, motorways	national	economy of scale
Agricultural society	Land	local roads	local	hard work

While distance was a major factor in an agricultural society, nowadays people can contact anyone any time, and the number of potential connections and links has increased exponentially.

In a knowledge-based society, the key question is how to solve complex problems and attract and implement investment projects that contribute to maintaining economic activity.

TRUST PLAYS A CRUCIAL ROLE IN COMPLEX SYSTEMS

Trust is a basic precondition for maintaining and operating complex systems. This is because the number of iterations and connections between autonomous players in such complex systems is very high. And these connections only work well in the long run if trust is established between the participants. In road traffic, this is especially important, so much so that the Hungarian Highway Code contains a so-called **trust principle**. In essence, everyone taking part in traffic knows and abides by traffic rules. This is the trust that allows people to go on green, as they trust that others will act as expected when they see their own red light.

▲ **However, some global megatrends lead to a loss of confidence and polarisation.** The Edelman Institute has monitored the evolution of trust in governments, companies, the media and NGOs around the globe for 20 years. According to the Institute, there have been five main megatrends related to trust in recent decades, which could pose a challenge to societies in the 21st century:

- ▶ The different strata in society exhibit different levels of trust, and societies are divided.
- ▶ Trust in governments is usually lower than trust in companies.
- ▶ Fake news has proliferated.
- ▶ Establishment of the network of trust: trust no longer depends on authority, respect or official records, but instead on peer-to-peer opinion (Eric S. Raymond).
- ▶ Rise in fears: fear from globalisation, automation, artificial intelligence and rapid progress

Table 13.2: Global megatrends determining trust

Source: Edelman Institute: 20 years of trust



Figure 13.3: Level of trust vis-à-vis certain people

Source: Edelman Barometer 2021



EDELMAN
TRUST
BAROMETER

SOCIAL PARTNERSHIP CAN STRENGTHEN TRUST

Many successful examples have been seen in the past decades, **when economic policy reforms, coupled with social contracts and broad-based strategic agreements, resulted in dynamic economic growth.**

The Irish society and economy was in very bad shape by the end of the 1980s. The economy was stagnating and taxes were rising, along with government debt. At the end of the decade, decision-makers placed economic policy on a new footing. In addition to various other measures, the National Economic and Social Council was established, with the participation of the government and employer and employee organisations. The strategy of this tripartite institution (Strategy for Development) paved the way for economic policy in 1987–1990. **In Ireland, the social partnership between the government, employers and employees proved to be highly successful.** In the next decade, the average growth rate of the Irish economy was close to 5 per cent (O'Donnell, 2018).

Another European example is **Estonia, a former Soviet country that came to spearhead the use of digital technologies.** After the political transition, economic policymakers determined two main areas for development: information and communication, and education. According to Simon (2015), the plans were truly successful because of the social dimension, which was partly attributable to historical causes. The Protestant culture and a strong competitive spirit can have a favourable impact on achievements, which has a good and a bad side as well. In addition to competition, the ability to cooperate is enhanced and trust is built vertically as well as horizontally.

▶ A different **social partnership was used in Singapore**, where the first prime minister of the country, Lee Kuan Yew, governed the country between 1959 and 1990. To promote economic development, Lee considered it important to build up a strong state, create national unity, resolve ethnic tensions, open up to other countries and offer equal opportunities to citizens (Czirják and Klemensits, 2018). In contrast to other state-controlled systems, bureaucracy was efficient, there was minimal corruption and crime rates were low (Lim, 2008).



LEE KUAN
YEW AND
THE SINGAPORE
HE BUILT

REFERENCES

- Czirják, R. – Klemensits, P. (2018): A szingapúri fejlődési modell megvalósításának lehetőségei szubszaharai Afrikában Ruanda példáján keresztül (Opportunities for implementing the Singaporean development model in sub-Saharan Africa through the example of Rwanda).
- Edelman Institute: 20 years of trust.
- Edelman Institute, Edelman Trust Barometer 2021
- Lim, L. (2008): Singapore's Economic Growth Model – Too Much or Too Little?
- O'Donnell, R. (1998): Ireland's Economic Transformation, Industrial Policy, European Integration and Social Partnership
- Raymond, E. S. (1999): The cathedral and the bazaar
- Rzevski, G. (2015): Complexity as the defining feature of the 21st century
- Saunders, I. T.: What is complexity?
- Simon, T. (2015): Az észt információs társadalom és oktatási rendszere (The Estonian information society and education system)

III

How “value” is
created in
the 21st century

KATALIN KIS

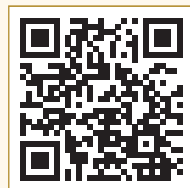
CREATING
ECONOMIC VALUE
IN THE DIGITAL AGE

Value is based on knowledge,
creativity and market gap

*“I call the age we are entering
the creative age because the key factor
propelling us forward is the rise of creativity
as the primary mover of our economy.”*

(Richard Florida)

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



The economy of the future will rely more on the talent, creativity and risk-taking of the people and companies involved, rather than on traditional resources. These limited resources are the bottleneck in the new corporate value creation. In the labour market of the future, everyone will have to add value and constantly adapt to the digital environment. It is no longer just the skills that come with education that are important, as the demand for social and emotional skills, as well as higher cognitive skills, will grow. This is particularly true for entrepreneurs, for whom finding a new idea and a niche market is more important than capital. Digitalisation may also change the profile of traditional companies. While robotisation is gaining ground in production, personal needs are at the centre of attention in development and sales, and thus in the wake of mass production there is room for a different attitude, a new kind of creativity. Meeting the personal needs of customers in real time is always a priority when creating a production or a design, which increases the importance of creative industries. **In the digital ecosystem of Industry 5.0, flexible, integrated value chains and industrial collaborations will become the main value creator.**

IN THE DIGITAL AGE, THE SOURCE OF CORPORATE PROFIT IS CREATIVITY

Nowadays, the driving force behind the rise of creativity is the number one socio-economic change: the information and technological revolution, which has created a global network economy based on services, in which human knowledge has become the most important economic and value-creating factor. The innovations of the digital revolution are reshaping corporate rankings and creating opportunities for tech companies to break out.

The composition of the top ten companies with the highest market values has changed significantly over the past twenty years. **In the past, oil companies and manufacturing firms topped the corporate rankings, with large amounts of physical capital; today, however, it is typically software companies, with intangible assets, licensing rights and brand value at the top of their balance sheets.** After the turn of the millennium, the list of companies ranked by market capitalisation was led by companies in the financial sector (Citigroup, Bank of America, Berkshire Hathaway) and in energy and oil refining (Exxon, GE, Shell) (*Figure 14.1*).

Figure 14.1: Top 10 market companies ranked by market value

Source: Financial Times, Companiesmarketcap

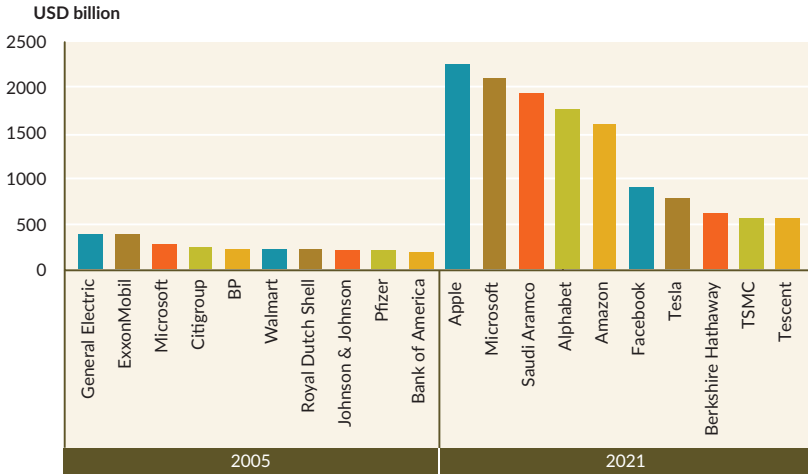
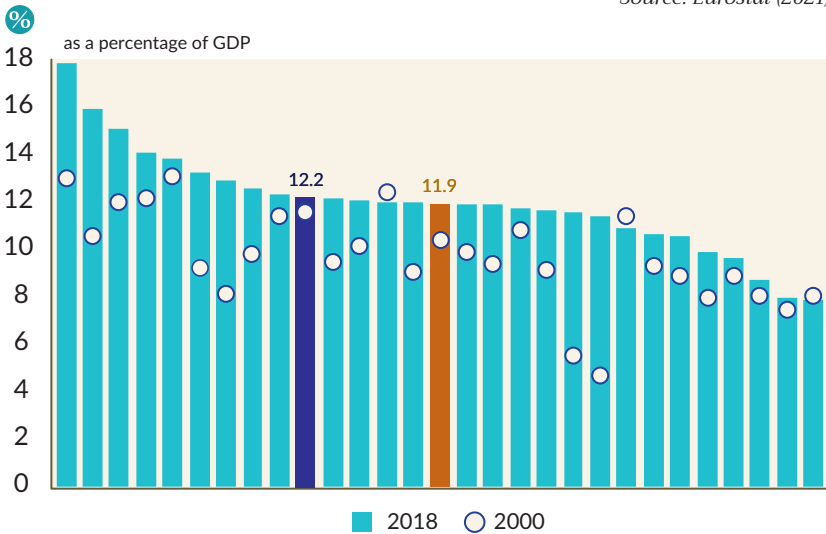


Figure 14.2: Weight of creative industries in EU countries

Source: Eurostat (2021)



However, much of the recent economic growth has taken place in the IT sector, and the importance of technology companies has grown steadily since the emergence of Industry 4.0. Today, Apple, Microsoft, Alphabet, Amazon and Facebook top the corporate league tables, and their value far exceeds that of companies in other sectors.

If one wants to describe the essence of Industry 5.0 using a single term, one should use the term “customised”. When creating a production or a design, the first priority is always to meet the personal needs of customers in real time. In other words, the aim is not only to improve the productivity of industry, but also to increase the comfort of life and customer satisfaction.

The nature of the creative economy is constantly changing. The rise (or fall) of some sectors spills over into other segments of the creative economy, influenced by a number of factors, which in turn affect economic growth and our own way of thinking:

1. Multiplier effect: empirical research shows that the multiplier effect of the programme production and broadcasting sectors ranges between 1.7 and 1.9. That is, 100 dollars spent in these sectors generates around 170–190 dollars in value added.
2. Shared intellectual property rights: companies in different sectors use a common “brand” (shared character, story, design) to increase profits, and thus a common brand creates vertical integration.
3. Creative technology: today there is a growing overlap between the digital and creative industries, which is expected to increase with the rise of artificial intelligence, the use of visual effects and new tools in production.
4. Opinion-forming role: through films, music and books we encounter the values of others, and so the products of the creative industries also shape people’s opinions.

The size of the creative economy has been growing steadily over the past period (Figure 14.2), and this growth may continue in the future. In 2019, the value added by the arts and creative industries in the US amounted to USD 920 billion, or 4.3 per cent of GDP, reflecting an increase of nearly 80 per cent over the past 20 years. **Creative industries now contribute more to the US economy than construction, transport and warehousing, travel and tourism, mining or agriculture (NASAA, 2021).** The situation is similar in the labour market, with the number of people working in the creative industries in the UK growing around three times faster than the average over the past decade, with 2 million people employed in the sector, which could reach 3 million by 2030 (Creative Industries Federation, 2021).

Figure 14.3: Evolution of the smiling curve in the digital age

Source: Szalavetz (2020, p 17).

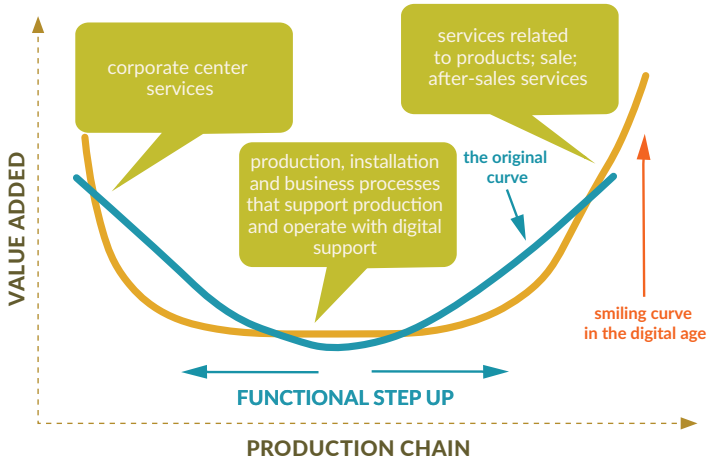
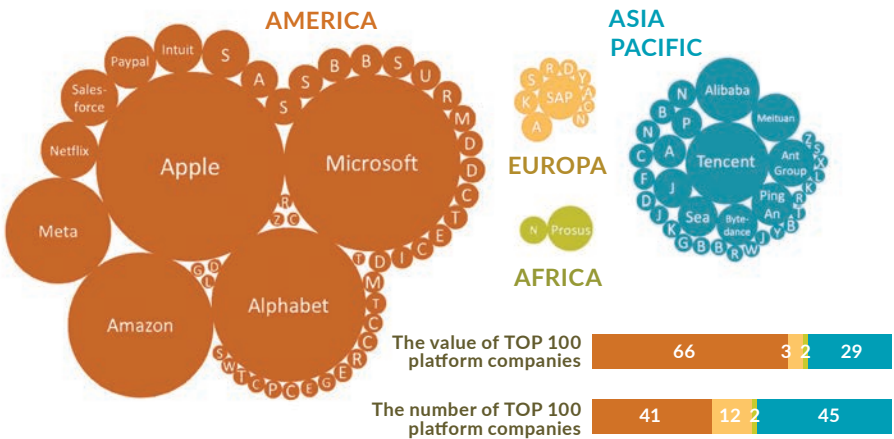


Figure 14.4: Top 100 platform companies (October 2020)

Source: <http://www.netzoekonom.de/plattform-oekonomie>



HOW WILL
ARTIFICIAL INTELLIGENCE
CHANGE THE CREATIVE
INDUSTRIES?

Today, interrelated activities in the production value chain contribute to the total market value in a different proportion than in the past, as illustrated by the smile-shaped curve (*Figure 14.3*). In the manufacturing sector, the added value of pre-production (R&D, design) and post-production (product support, marketing) value chain activities is much higher than in the middle part, the production stage. The correlation has not changed in the digital age, but the middle part of the curve has flattened. At the beginning of the production chain, the strategic importance of corporate headquarters/services has increased, as the business environment in the digital age is more complex and uncertain. From the aspect of competitiveness, new tasks of strategic importance have emerged, such as the creation of new business models and business ecosystems, or the development of innovation cooperation networks (Szalavetz, 2020). **More and more of today's most successful business models are built on or around a platform**, with startups leading the way, but even mature companies are building their models at a rapid pace (*Figure 14.4*).

THE KEY TO INNOVATION IS ENTREPRENEURIAL RISK-TAKING

The true value-creating potential of a company is the creativity and ideas of an entrepreneur. Every really successful business starts from a good idea, often in a garage, with no financial or physical capital, with a name behind the big success. The names behind today's top companies are Jeff Bezos, Bill Gates, Mark Zuckerberg, Steve Jobs and Elon Musk, which have become "brands" in their own right. Young startups account for a large part of economic growth. In Hungary, firms in the youngest age group (1–4 years) produce only 7 per cent of total value added, but despite their low weight, they account for 70 per cent of growth (Bauer and Endr sz, 2018). ◀

The primary drivers of the capital- and knowledge-intensive growth model are productive enterprises and the entrepreneurs who build and run them. According to  cs et al. (2020), entrepreneurship is determined by several factors. These include the identification of opportunities, risk-taking and relationship building, product and process innovation, and the use of technology or venture capital. A vibrant entrepreneurial ecosystem is based on the acceptance of failure and the determination to start again. **The willingness to take risks is a major determinant of an economy's entrepreneurial culture and its potential for innovation.** The Global Entrepreneurship Index (GEI) also confirms the differences in attitudes towards entrepreneurship.

Figure 14.5: Dimensions of entrepreneurial attitudes

Source: Global Entrepreneurship Index 2019

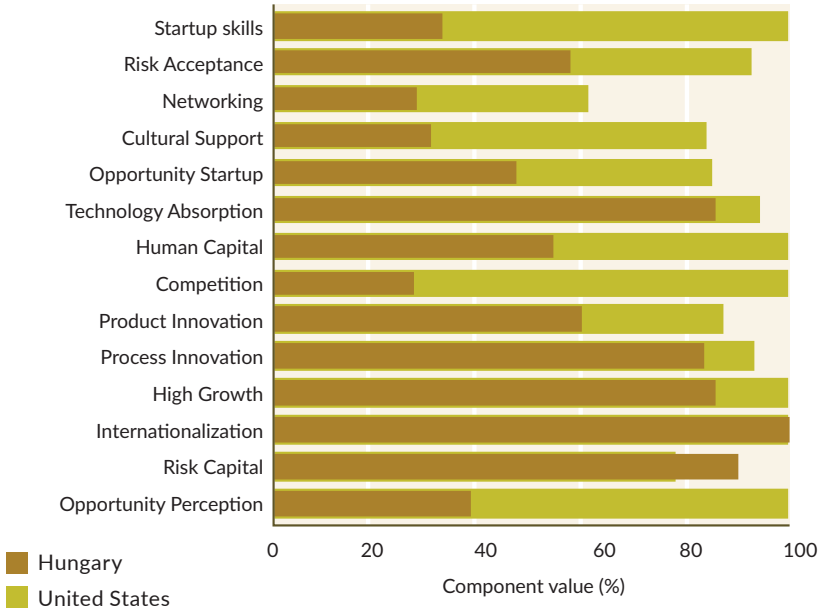
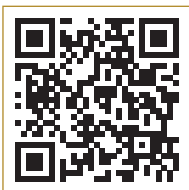
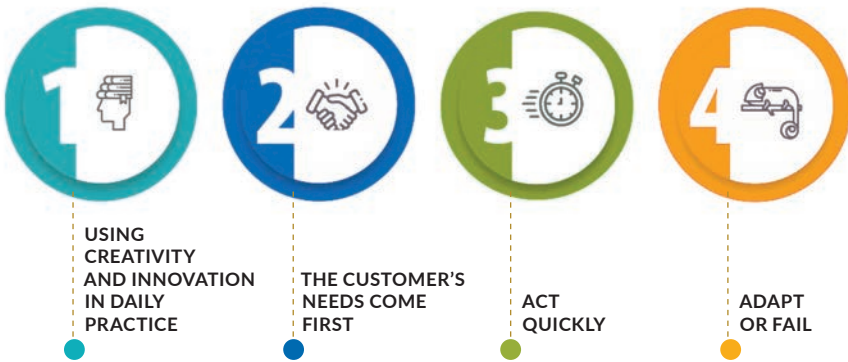


Figure 14.6: Four key management practices to turn creativity into profit

Source: Brodtherson et al. (2017)



STEVE JOBS:
TODAY I WANT TO
TELL YOU THREE
STORIES
FROM MY LIFE

Hungary is a risk-averse country by international standards, lagging significantly behind the USA or developed European and fast-growing Asian countries. In addition, Hungary also lags behind in sub-indices measuring the recognition of opportunities, risk-taking, cultural support, startup skills and opportunities, and networking (*Figure 14.5*).

CREATIVE EMPLOYEES – MANAGEMENT'S PREFERENCE IN THE DIGITAL AGE

Digitalisation is transforming the nature of work processes, increasing flexibility in space and time, as well as in the way work is done. In the labour market of the future, it is important for everyone to meet the following three criteria, regardless of the sector they work in:

1. provide added value beyond what automated systems can do;
2. the ability to work in a digital environment;
3. continuous adaptation to new ways of working.

In the future labour market, the demand for physical skills and basic cognitive skills will decrease, while the demand for technological, social and emotional, higher cognitive skills will increase. In their study, Dondi et al. (2021) started from four main skill categories – cognitive, digital, interpersonal and autonomous leadership – and then identified 13 different skill sets for the categories that will need to be met in the future labour market (*Figure 14.7*). Leaders are already experiencing the challenges of using online tools; they see and feel the need to prepare for change, but the need to combine digital strategy, innovation and AI, and a change in leadership style is still to come. “Human”, human-related terms such as “personal”, “each other”, “relationships”, “family”, “friend” are the most important in management thinking, which shows the importance of human relationships, with the focus on the human being. Time should be spent on preparation and training (Bencsik, 2021).

Effective creativity supports growth and business performance, comes from “solving the problem” and having leadership practices that can help you see the process and then create tangible business results (Brodherson et al., 2017). The best-performing companies focus on four key management practices to turn creativity into profit (*Figure 14.6*).

Figure 14.7: Human skills and attitudes for the future labour market

Source: Dondi et al. (2021)



REFERENCES

- Ács, J.Z. – Szerb, L. – Song, K.A. – Komlósi, É. – Lafuente, E. (2020): The Digital Platform Economy Index 2020. The Global Entrepreneurship and Development Institute.
- Bauer, P. – Endrész, M. (2018): Vállalati dinamika és aggregált növekedés Magyarországon (Firm Dynamics and Aggregate Growth in Hungary). Hitelintézeti Szemle (Financial and Economic Review), Vol. 17 Issue 2, pp. 68-98.
- Bencsik, A. (2021): Vezetői felkészültség felmérése a digitális kor kihívásaira – Nemzetközi Összehasonlítás (Survey of Manager Preparedness for Digitalisation – International Comparison) Vezetéstudomány (Budapest Management Review), Vol. 52, Issue 4, pp. 93-108.
- Brodherson, M. – Heller, J. – Perrey, J. – Remley, D. (2017): Creativity's Bottom Line: How winning companies turn creativity into business value and growth. McKinsey & Company, June 16, 2017.
- Creative Industries Federation (2021): The UK's creative industries statistics. www.creativeindustriesfederation.com/statistics
- Deloitte (2021): The Future of the Creative Economy. June 2021.
- Dondi, M. – Klier, J. – Panier, F. – Schubert, J. (2021): Defining the skills citizens will need in the future world of work. McKinsey & Company, June 25, 2021.
- NASAA (2021): National Assembly of State Arts Agencies – Creative Economy State Profiles. https://Nasaa-Arts.Org/Nasaa_Research/Facts-Figures-On-The-Creative-Economy/
- Szalavetz, A. (2020): Who benefits from digital transformation? Műhelytanulmányok, 139. Közgazdaság- és Regionális Tudományi Kutatóközpont, Világgazdasági Intézet (Institute of World Economics, Research Centre for Economic and Regional Studies), pp. 1-45.

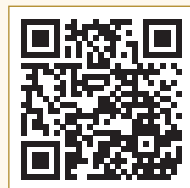
BÁLINT DANÓCZY – PÉTER SAJTOS

NEW FORMS OF PRODUCTION
AND SERVICES
Access, circular
and platform economy

*“New lamps for old,
I’ll turn rubbish into gold.”*

(Aladdin, Walt Disney)

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



It has become evident that our social development must be transformed in the spirit of sustainability. As we face more and more global challenges in creating value, it is increasingly important to develop an economic mindset that focuses on real, long-term goals – rather than growth as the primary idea. As a solution, **smart green growth** was discussed by Christine Lagarde, president of the European Central Bank, in March 2021.

To achieve this, we need to move away from the previous linear production value chain towards a circular, access-based and platform economy. The new economic leaders will be businesses that help consumers and value chains – and thus the whole economy – to reduce squandering, pollution and waste. Environmental and structural changes in the economy, as well as the technological opportunities of the 21st century, could fundamentally change economic thinking and the way we think about value creation.

WE NEED ECONOMIC MODELS THAT PROACTIVELY TARGET SUSTAINABILITY BY EFFECTIVELY LINKING SUPPLY AND DEMAND

The creation of value, the process of value creation and the life cycle of a product are based on the so-called **linear economic model** in the classical understanding. The life cycle of a product is basically defined by the following three phases: they are manufactured, used and disposed (*Figure 15.1*). **Nowadays, the relevance of this economic model is questionable in many respects**, as new directions and concepts of value creation have emerged (e.g. extending the life of raw materials and resources), which focus on long-term sustainability (e.g. economic, social, environmental) (Nußholz, 2017).

Figure 15.1: The circular economy and the current linear modell

Source: Unterfrauner et al., (2017, p. 10).

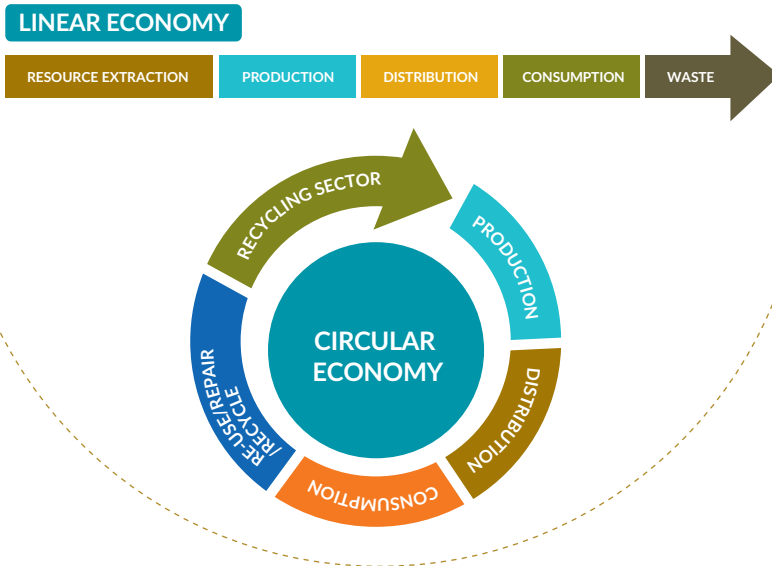
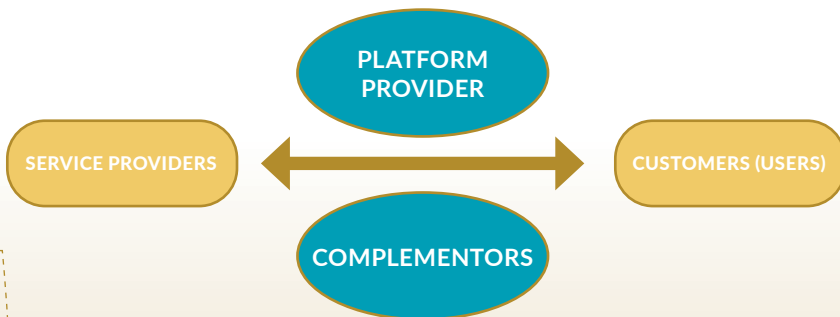


Figure 15.2: The general platform-based modell

Source: Wirtz, J. (2020): Introduction to Platform Business Models – Master Class
https://www.researchgate.net/publication/340939652_Introduction_to_Platform_Business_Models_-_Master_Class



***FUTURE ORGANISATIONS MUST SEEK
A BALANCE BETWEEN THE ECONOMIC,
SOCIAL AND ECOLOGICAL DIMENSIONS
OF VALUE CREATION.***

(Senge-Carstedt, 2001)

The potential of the **circular economy** is attracting increasing attention globally, but translating it into practice is a complex issue, as repositioning supply chain and consumption strategies towards recycling and reuse fundamentally breaks with the centuries-old linear model of the economy.

There are several steps to achieving a circular economy. First, the benefits of a platform economy, then, within that, a sharing economy, and finally a circular economy should be harnessed to achieve a sustainability turnaround along a long-term and proactive economic theory.

- ▶ The **platform model** can usually be interpreted as a new level of intermediation within the supply chain, but it still makes processes simpler and faster for consumers (Figure 15.2). The different variants of the model (Figure 15.3) essentially aim at **shortening the value chain** or improving the linkages between actors. In practice, by **minimising intermediaries**, new industries with shorter and more efficient value chains are created, resulting not only in increased consumer value but also in lower costs. Given the technological embeddedness of the platforms, the role of parties providing additional services – typically technical infrastructure – (complementors) is essential. These companies (e.g. Microsoft, Google, Amazon) make solutions available that can further increase the value of products/services of the platform provider and the party offering services on the platform for the consumer.



WHAT IS A SUPER APP,
AND WHY HAVEN'T
THEY GONE GLOBAL?
CNBC EXPLAINS

Figure 15.3: Different platform-based models

Source: Wirtz et al., 2019, p. 454

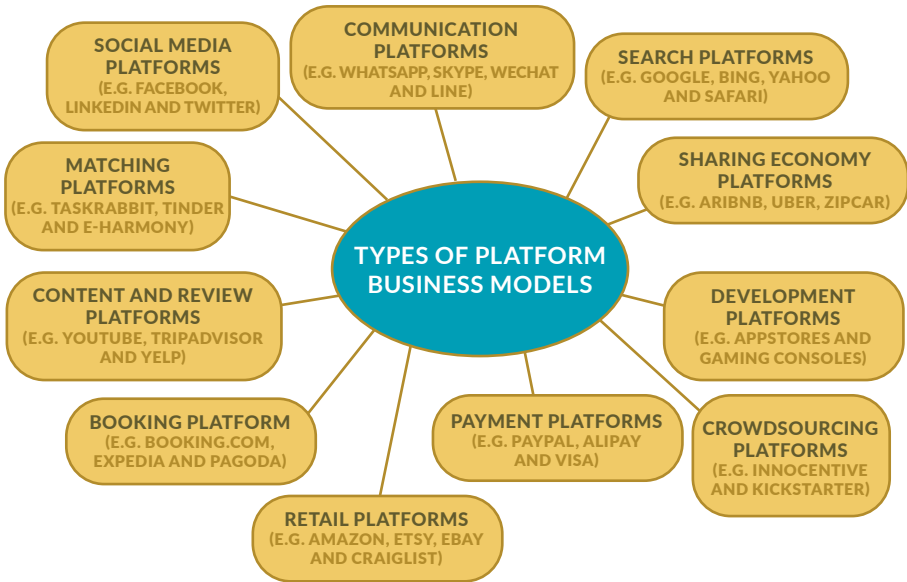


Figure 15.4: Circular economy and the so-called “5 R”

Source: The EU Circular Economy Action Plan

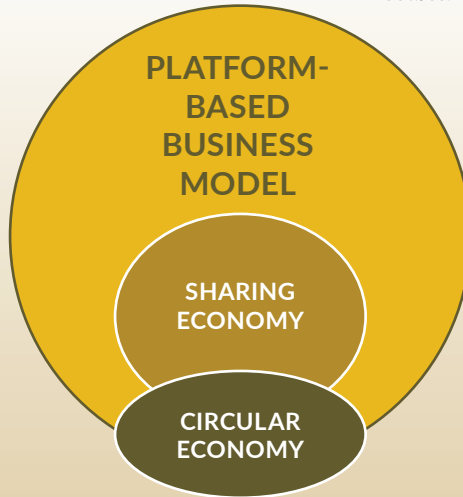
Note: The “5 R” expression, summarising the circular economy process, is derived from the initials of the key words of the processes: Refuse, Reform, Reduce, Reuse, Recycle.



- ▶ The main principle of the **sharing economy model** is specifically the efficient matching of supply and demand. In this unique platform model, limited but **underutilised assets and resources are matched with consumer demand**. In practice, it is the sharing of economic goods between individuals that makes the model work, putting value creation and consumption in a new light: given that most goods are not used continuously, it is rational to make them useful during these times, i.e. to share them. A further advantage of this model is that fewer products need to be produced overall, so there is less squandering and waste, while the economic value added can be kept broadly constant. While there are (significant) efficiency gains at the level of the specific means of production, in a broader sense, the central infrastructure may be under greater pressure.
- ▶ The **circular economy model** is based on the durability of resources and the goods produced and on ensuring that they remain so, even through multiple uses. In a circular economy, **one person's trash becomes another's treasure**. Put very simply, by collecting and recycling used batteries from old laptops and phones that are no longer in use, they can become reusable. It is important to note, however, that (i) **recycling** is only a relatively minor element of this model (Recycle), as it requires (ii) **rethinking** production and consumption (Refuse), consciously designing products for their longest useful life and then (iii) planning their **renewal** (Reform), (iv) **preventing** unnecessary production and consumption without reducing economic utility (Reduce), promoting the reusability of products that are no longer fit for their original purpose, or (v) promoting the resale of products that are still fit for their intended purpose (Reuse) (*Figure 15.4*). The main novelty of the circular model is the mandatory return by the user. In effect, this serves to end indefinite ownership and prevent the loss of valuable raw materials.

Figure 15.5: The platform can be one of the basic pillars in the 21st century

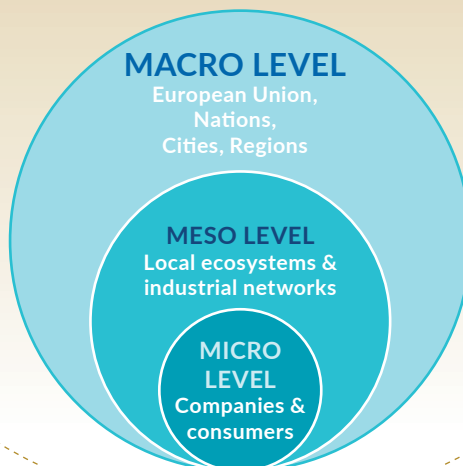
Source: Author's compilation



IN A CIRCULAR ECONOMY, ONE PERSON'S TRASH BECOMES ANOTHER'S TREASURE.

Figure 15.6: Levels of the circular economy

Source: Vanhamäki, S. – Medkova, K. – Malamakis, A. – Moussiopoulos, N. (2019): *Bio-based circular economy in European national and regional strategies. International Journal of Sustainable Development and Planning 14(1):31-43*

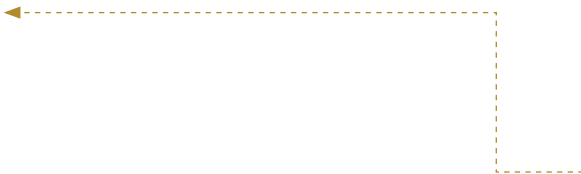


A SHIFT TOWARDS A CIRCULAR ECONOMY CAN ADDRESS BOTH CURRENT PROBLEMS AND FUTURE CHALLENGES

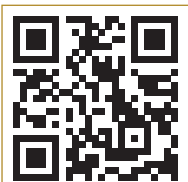
Some models of shifting to new forms of production and service aim to reduce negative externalities and capture the sustainability of value creation and the economic thinking behind it: **the use of finite resources and the rationalisation of production in terms of sustainability**. And between the two, **overconsumption** can be identified, the handling of which is an important challenge both in the present and the future (Overshoot Day, 2021). **Digitalisation plays a key role** in the transition to sustainability, with technology and data as the two main pillars. They are a guide not only for making the transition, but also for recognising the transition that is needed: finite resources and their time horizons, as well as the larger issues affecting the structure of the economy and its long-term sustainability can be identified and quantified, at least approximately.

Sharing economy models based on platforms (*Figure 15.5*) represent a progressive direction in this transition. On the one hand, they improve access to the basic goods of everyday life at the societal level, replacing the economic system based on ownership; on the other hand, they substantially reduce a number of negative externalities relevant at the global and environmental level. **Although the sharing economy is only a transition towards the circular economy**. It does not solve the problems of waste, finite energy resources and overconsumption, it “only” delays the problems from surfacing. For example, the use of low-emission products is now popular and forward-looking, but the environmental burden of their creation and consumption remains significant. This gap can only be bridged by the circular economy: via simultaneously and drastically changing consumption and recycling habits.

According to Kristensen and Mosgaard (2020), different levels of the implementation of the circular economy can be defined (*Figure 15.6*), each of which should be given priority. The transition to a circular economy depends on the combination of several pillars: (i) **technology**, (ii) **government incentives**, (iii) **incentives for private sector, the companies** and (iv) **the role of society**, i.e. making the final consumers interested in the short term.



**IT IS NECESSARY TO CREATE
A SUSTAINABLE ECONOMY
IN WHICH THE DECADES-OLD IDEA
OF GROWTH IS NO LONGER
THE PRIORITY,
BUT IS REPLACED BY REAL,
LONG-TERM GOALS.**



**TOXICITY:
LIFE AT AGBOGBLOSHIE,
THE WORLD'S
LARGEST EWASTE
DUMP IN GHANA
| RT DOCUMENTARY**

The need for the shift to a circular economy is reinforced by a number of increasingly acute factors (e.g. climate change, production problems, drastic price increases and waste generation). However, there are many more factors that make the transition more difficult, and thus the emergence of a circular economy and its widespread adoption in the short term is still in doubt. One of the main reasons for this is that **reversing the current value chains is against the interests of many actors**. Achieving that raw materials are not disposed at the end of consumption but are returned to the cycle is a labour- and energy-intensive and therefore costly process. Globally, for the time being, we see that transport is one of the first central areas for the creation of a circular economy, partly through the spread of electric car usage. We can already see many positive benefits (e.g. reduction of urban air pollution), but it is also important to highlight the difficulties with the transition: although actual consumption (travel) can be described as “zero emission”, the steps before and afterwards are still extremely polluting.

According to calculations published by the World Economic Forum (WEF) in 2019, 30 per cent of the 2030 Paris Agreement targets could be met if the circular economy model was implemented.

REFERENCES

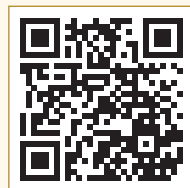
- Kristensen, H.S. – Mosgaard, M.A. (2020): A review of micro level indicators for a circular economy – moving away from the three dimensions of sustainability? *www.sciencedirect.com/science/article/abs/pii/S0959652619334018*
- Nußholz, J. (2017): Circular Business Models: Defining a Concept and Framing an Emerging Research Field, *www.researchgate.net/publication/320313492_Circular_Business_Models_Defining_a_Concept_and_Framing_an_Emerging_Research_Field*
- Overshoot Day (2021): <https://www.overshootday.org/>
- Senge, P.M. – Carstedt, G. (2001): Innovating Our Way to the Next Industrial Revolution, MIT Sloan Management Review, Winter 2001. *https://cmappublic2.ihmc.us/rid=1182804950453_151557719_7013/MITSloanManagRev_2001_42_24.pdf*
- WEF (2019): A vision for a Sustainable Battery Value Chain in 2030 *www.weforum.org/docs/WEF_A_Vision_for_a_Sustainable_Battery_Value_Chain_in_2030_Report.pdf*

BENCE TRINGER

THE NEW ECONOMY
REQUIRES A REFORM
OF MEASUREMENT

“Economic contexts are changing faster and faster; thus, more and faster factors need to be measured... This requires new metrics in addition to and instead of those used today.”

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



As economic activity continues to change, GDP is becoming less and less suitable as an accurate measure of the changing economic system and an indicator of sustainability. New metrics are therefore needed to replace and complement those used today. **The new compass is long-term sustainability**, where both parts of equilibrium growth – equilibrium and growth – need to be measured more widely, more quickly and more reliably than today. At the heart of the information economy there is human capital and available information, data. We are also seeing an exponential increase in the amount of data and computing power available to us, providing economics and policy-makers with unprecedented measurement capabilities.

GDP IS NOT A SUITABLE MEASURE OF SUSTAINABILITY

In social sciences, including economics, measurement has had a very limited presence for a long time. The data and information were more about price conditions in a particular market. The onset of the world economic crisis in 1929 created the need for the macroeconomic theory and statistical practice necessary to understand the nature of recessions, which had been lacking until then (Coyle, 2014).

The primacy of GDP as a measure of the economy has led us to believe that it is worth treating it as a natural phenomenon. GDP, on the contrary, is just an economic concept; it is not self-evident what we mean and what we measure when we measure economic growth. The economic system that surrounds us has changed a great deal since the birth of GDP. **The backbone of the modern market economy is no longer mass-produced goods on production lines, but services and intangible goods.** The welfare benefits of technological progress can only be partially captured by the national accounting system, which is illustrated by the fact that, despite revolutionary changes in the lives of people and businesses, the added value of the technology sector has not changed significantly in recent decades (Figure 16.1). Another statistical difficulty is the increase in the share of investment in intangible assets, the stock and amortisation of which is difficult to estimate (Figure 16.2).



GROWTH REPORT (2017)

Figure 16.1: GDP share of the information and communication sector and share of the population using the internet in the European Union

Source: Eurostat, OECD

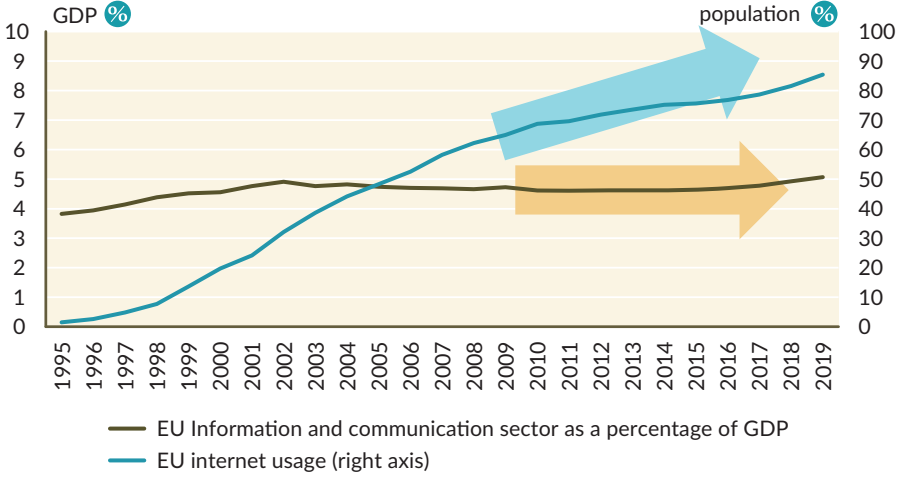
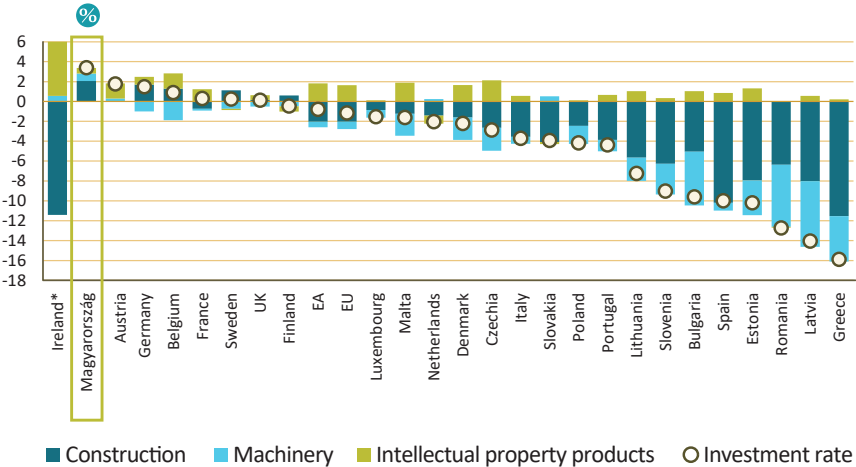


Figure 16.2: Changes in the investment rate between 2007 and 2019 in EU countries

Source: MNB calculation, based on Eurostat data



GDP performs reasonably well in measuring economic activity, but it still does not reflect the well-being of the families that make up society, and its biggest shortcoming is that it says nothing about any dimension of sustainability. Neither environmental, nor financial, nor social sustainability, nor the ability of growth to renew itself through innovation and creativity can be established based on GDP. But without sustainability, economic growth is like a financial bubble that will burst sooner or later, undoing decades of progress. It follows, therefore, from the method of measurement itself that the economic model of the 20th century, as measured by GDP, has not only depleted environmental resources but has also placed a financial burden on future generations, while social cohesion has been significantly weakened by the developments of recent decades. A further shortcoming of GDP is that it does not carry information on the evolution of stock inputs of production, the accumulated capital assets. The net investment obtained by taking into account the depreciation of capital goods is often insufficient to re-produce capital goods (Figure 16.3). In the information age, when the creation of value added is increasingly based on knowledge-based services, the sustainability of human capital and natural and social resources must be reflected in the practice of measuring the economy (Figure 16.4).

Many alternative indicators have been developed over the past decades, but none has been able to replace the System of National Accounts. The first set of alternative indicators does not break with the monetary approach to GDP, but simply makes adjustments to the calculation to exclude factors that do not contribute significantly to welfare. In contrast, composite indicators are derived by weighting a wide variety of quantitative indicators, the most common of which is the HDI (Figure 16.5). The third group of alternative indicators includes indicators based on qualitative subjective surveys (Figure 16.6).

THE AGE OF ACCESS REQUIRES A NEW MEASUREMENT OF PRICES

Technological progress has a major impact on both our everyday lives and the economic system around us, and the prices of the goods we produce and consume are no exception. **However, a part of the impact of technological progress and digitalisation on consumer prices is not reflected in official statistics.** According to Reinsdorf and Schreyer (2019), digitalisation can cause distortions in consumer prices for three reasons.

Figure 16.3: Trends in net and gross business investment in the USA

Source: FRED, US Bureau of Economic Analysis

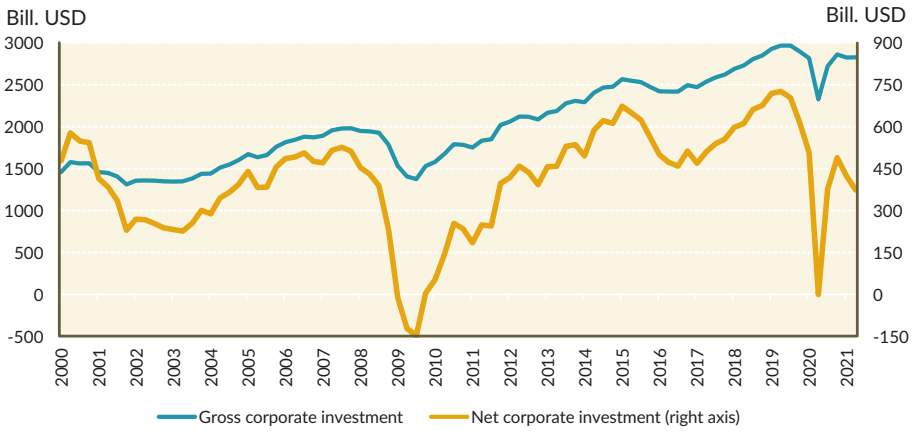


Figure 16.4: Schematic diagram of production factors

Source: MNB



1. The calculation of inflation takes into account only limited improvements in the quality of existing goods and services. Increases in vehicle equipment or the computing capacity of computers reduce comparability with earlier versions of products.
2. The emergence of new technologies can fundamentally change the way we consume, displacing previous consumption patterns and adding new categories to our shopping basket.
3. Since the emergence of the internet, we have seen the proliferation of free digital goods, such as free social networks, video sharing or search services. However, since they often do not involve direct financial transactions, the classical methodological practice underestimates the welfare-enhancing impact of these services. In the digital age, consumers/users can now capitalise not only on their labour, but also on access to their data. The measurement practices of the economy must keep pace with this as well.

BIG DATA REPRESENTS REVOLUTIONARY NEW WAYS OF MEASURING THE ECONOMY

Big Data means the technology and methodology for transforming large data sets into economically useful information. In addition to the challenges, the current abundance of data and new methodologies can help solve long-standing measurement problems (*Figure 16.7*). **Every time we use our phone to order a taxi, search for a nearby restaurant, or simply open an app, we create a spatially and temporally traceable digital footprint of our potential economic activity in the form of data.** These data can provide an opportunity to obtain information on the state of an economy from sources other than official statistics. Big Data can provide a fast and cost-effective way to gain unprecedented insights into new areas such as the consumption decisions of the population and the pricing practices of companies, and thus support a more accurate data-based understanding of the state of economic activity or price developments. The computing capacity will be available in the future, the only question is how to get the data (*Figure 16.8*). Using the wealth of data that digitalisation brings, we can more easily and accurately investigate hard-to-measure aspects of well-being, such as how individuals spend their leisure time (Schönberger – Cukier, 2014). The challenge for the decades ahead could be the widespread adoption of Big Data and learning algorithms, which in turn could fundamentally change the way the services sector operates.

Figure 16.5: Human Development Index (HDI) in countries around the world

Source: Ourworldindata

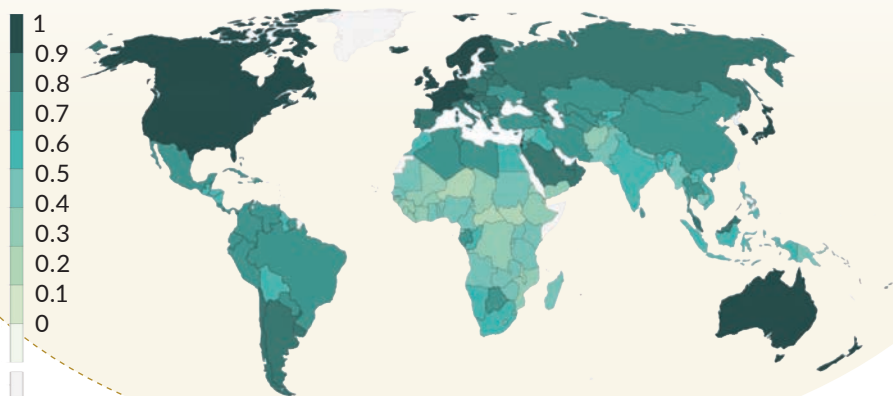
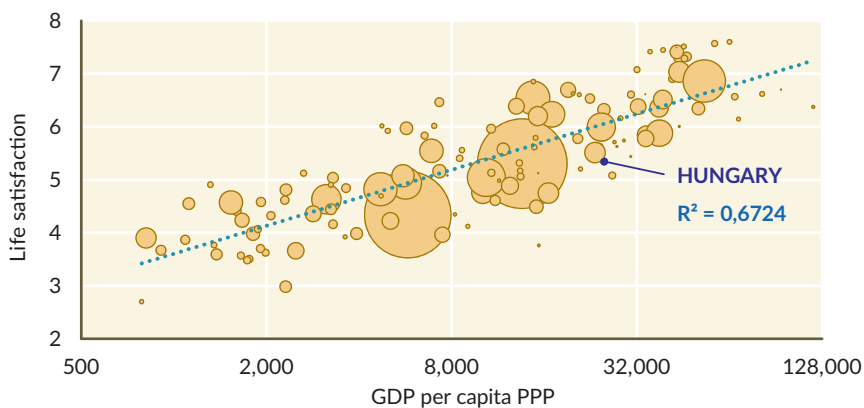


Figure 16.6: Relationship between life satisfaction and GDP per capita

Source: Ourworldindata "measuring the digital economy, GDP and productivity"



"MEASURING
THE DIGITAL ECONOMY,
GDP AND PRODUCTIVITY"

WE CANNOT AND SHOULD NOT WAIT: IMMEDIATE DATA ON THE ECONOMY

The formal methods of statistical data collection are not keeping pace with our fast-paced world, which is why alternative real-time data sources are needed to help us gain an immediate insight into economic processes. **The availability of statistical data with a delay of 1–2 months is sufficient to support economic policy-making in normal times, but it may prove to be too long a lead time in the case of a crisis.**

Immediate, high-frequency data provide information on temporary fluctuations in economic activity on a much shorter time horizon than the quarterly or monthly frequency of classical statistics, even on a daily basis, without delay, which was of particular importance during the economic downturn caused by the coronavirus. Furthermore, these data might be geographically disaggregated, allowing for a more detailed regional view of economic activity. **For example, data from searches on social networks can provide an instant picture of labour market trends.** Antenucci et al. (2014) created the “social media job loss” index by analysing postings on Twitter. The index was able to detect in real time the labour market impact generated by the US government shutdown in 2013 and the impact of Hurricane Sandy in 2012, both of which were associated with an increase in the index and subsequently reflected in official labour market data.

Economics and economic statistics came a long way before GDP was created. But over the past half century, economists have failed to respond effectively to the changing structure of the economy, digitalisation, and the emergence of new, previously non-existent businesses models. On the threshold of a paradigm shift in economics, the economic statistical tools of the future will be organised around sustainability. This change of mindset is already taking place today, supported in particular by the development of data science and Big Data, creating new methodological opportunities. The coronavirus crisis has prompted economists to look for new alternative measurement and forecasting tools that will support the measurement and forecasting of economic processes in our accelerated post-epidemic world.

Figure 16.7: Performance of classical econometric methods and learning algorithms as a function of data

Source: Harding, M. - Hersh, J. (2008)

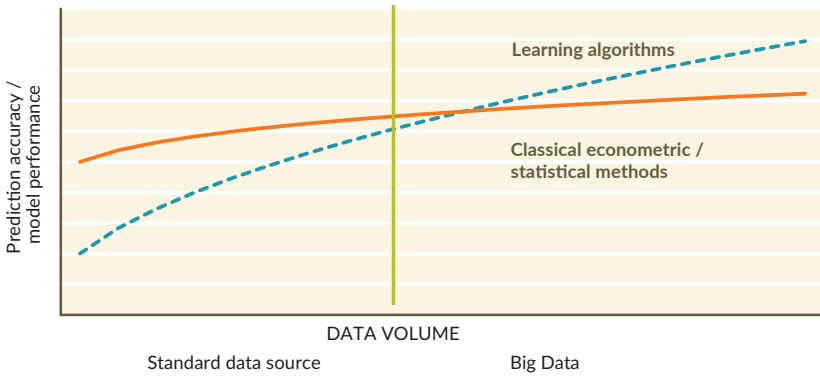
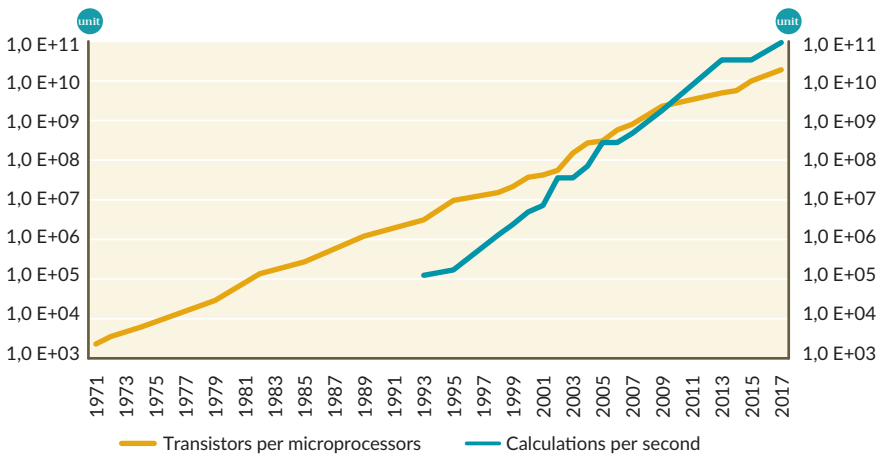


Figure 16.8: Changes in the number of transistors and the computation speed

Source: OurworldIndata, Karl Rupp. 40 Years of Microprocessor Trend Data. TOP500 Supercomputer Database



SOCIAL MEDIA
JOB LOSS INDEX

REFERENCES

- Antenucci, D. – Cafarella, M. – Levenstein, M.C. – Ré, C. – Shapiro, M.D. (2014): Using Social Media to Measure Labor Market Flows, National Bureau of Economic Research, Working Paper, Working Paper Series, March 2014.
- Coyle, D. (2014): GDP a Brief but affectionate history. Princeton: Princeton University Press.
- Harding, M. – Hersh, J. (2008): Big Data in economics. IZA World of Labor 2018.
- Reinsdorf, M. – Schreyer, P. (2019): Measuring consumer inflation in a digital economy, OECD Statistics Working Papers, No. 2019/01, OECD Publishing, Paris.
- Schönberger, V.M – Cukier, K. (2014): Big Data, HVG könyvek (HVG Book series).

IV

The balance of market and state

ZOLTÁN BÖGÖTHY,
RÓBERT HAUSMANN

A NEW, GREEN,
SUSTAINABLE
TAX SYSTEM

Basic principles for family-friendly,
digital, and environmentally
friendly modern taxation

*“We must tax pollution,
not people.”*

*António Guterres,
UN Secretary-General*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



In addition to traditional economic policy objectives, it is important that policymakers take into account new sustainability aspects in the design of future taxation (*Figure 17.1*). The priorities for the tax system have changed significantly. In the past, continuous economic growth was taken for granted, pollution and emissions were of little concern to policymakers, the population was generally growing in the developed countries as well, the world was less globalised, and digital services were not typical at all. Looking forward, **green taxes** should play a key role in promoting the environmental aspect of sustainability, which may help reduce burdens on the environment and create a more favourable balance between supply and demand. In designing the tax system for social sustainability, **family- and childcare-related taxation benefits** can add significant value in the interests of raising the birth rate. Digitalisation pervading the whole economy can also revolutionise the tax system and help to achieve fair public taxation that minimises tax avoidance by reducing the shadow economy.

THE POLLUTER SHOULD PAY! ...MORE TAXES, TOO

By the second half of the 2010s, the total resource demand of the world's population exceeded the Earth's renewable environmental resources by 70 per cent, which is attributable to the excessive ecological footprint of global economic growth. This stems from the fact that, in the current economic system, it appears appropriate to increase environmentally damaging emissions individually, even if they are already harmful at the national or global level. Economic theory refers to this phenomenon as the **tragedy of the commons**. As the consumption of public goods which are available to everyone free of charge but in limited quantities is not in itself constrained by any barrier, it is worthwhile for everyone at the individual level to consume a little more than is profitable and sustainable for society as a whole.

Figure 17.1: Pillars of a sustainable tax system for the future

Source: Magyar Nemzeti Bank, own editing

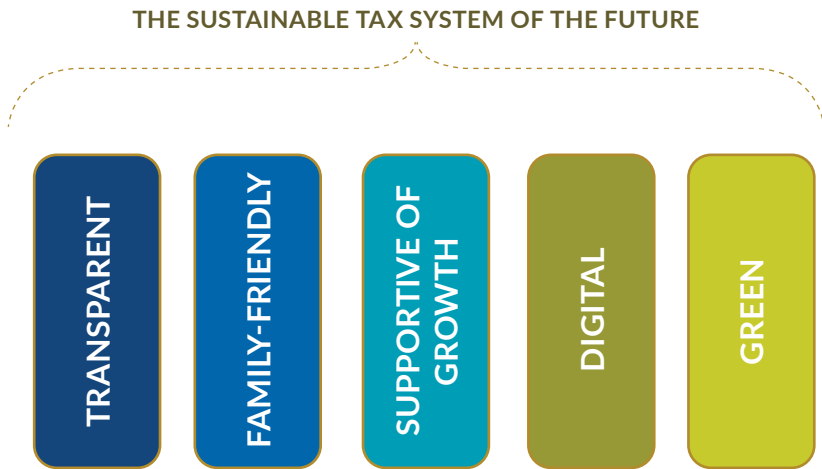
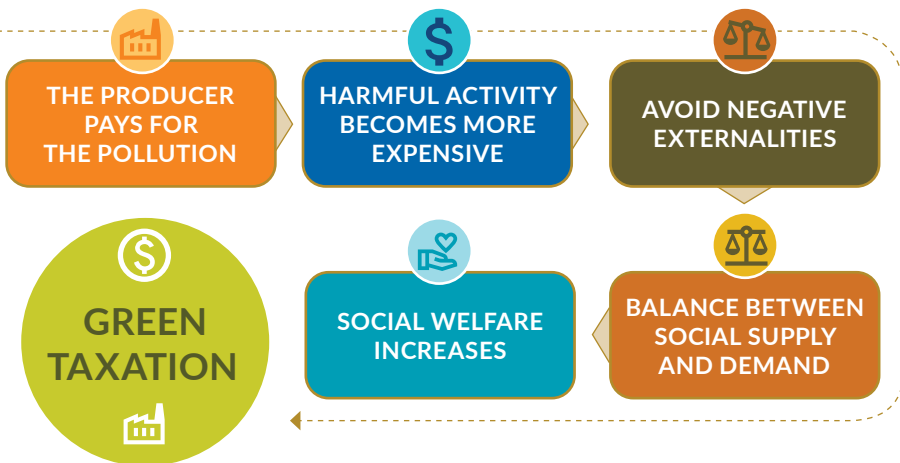


Figure 17.2: Mechanisms of green taxation

Source: Magyar Nemzeti Bank



Under proper market conditions, all of the consequences caused by the producer should be reflected in its costs, i.e. the polluter pays principle should apply. Economic theory refers to **negative externalities** as cases where the collateral consequences of the production or consumption of a given economic product do not occur at the level of the producer or user, but the monetisable costs are spread across the whole society (e.g. the operation of a polluting factory).

Pollution can be reduced by legal or financial regulations, and one form of the latter is imposing green taxes. The aim of green taxes is to raise the price of environmental resources, thereby reflecting the environmental damage caused by economic agents in their costs, and thus reducing the extent of environmental damage. **Well-designed green taxes increase social welfare** (Figure 17.2).

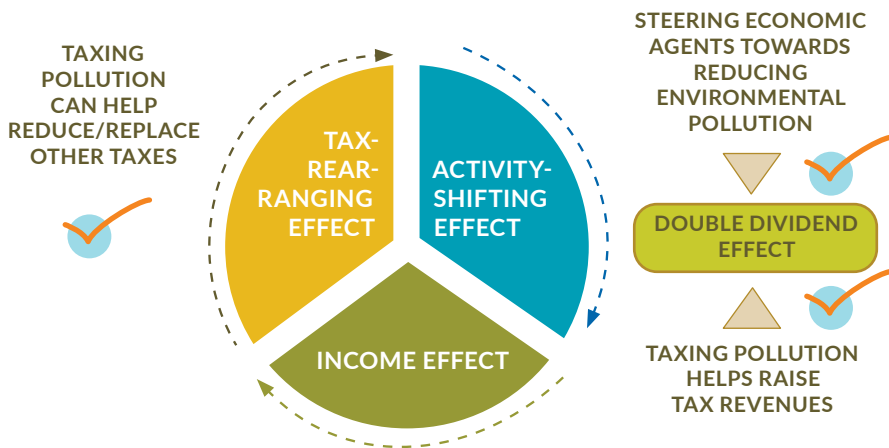
A number of interesting facts can be identified about the functioning of green taxes:

- ▶ a green tax is fairer and more effective if it is **levied on the producer responsible for the emissions**;
- ▶ the green tax has an activity-shifting and revenue effect, and the revenue effect **can be used to rearrange the tax structure** (Figure 17.3);
- ▶ green taxes can support a shift in the tax system towards strengthening external competitiveness if they are accompanied by a **reduction in taxes on labour**;
- ▶ **tax reductions and subsidies supporting environmentally damaging activities should also be phased out**, alongside the introduction of green taxes;
- ▶ the positive impact is doubled if the tax revenues from green taxes are used directly **for environmental purposes**;
- ▶ green taxes can also be seen as a **geopolitical tool**, as their introduction can affect a country's international relations and foreign trade opportunities;
- ▶ an increase in turnover-type green taxes may have an **inflationary impact**, which may result from a rise in the cost of the taxed activity and increasing consumption of more expensive, greener products.

Green taxes cushion the impact of growth-inhibiting factors, thereby **helping to sustain growth and convergence**. Mitigating negative environmental impacts affects labour productivity positively as well: green taxes reduce pollution by making environmental damage more costly, which leads to healthier living conditions.

Figure 17.3: The emergence of a double dividend in green taxation

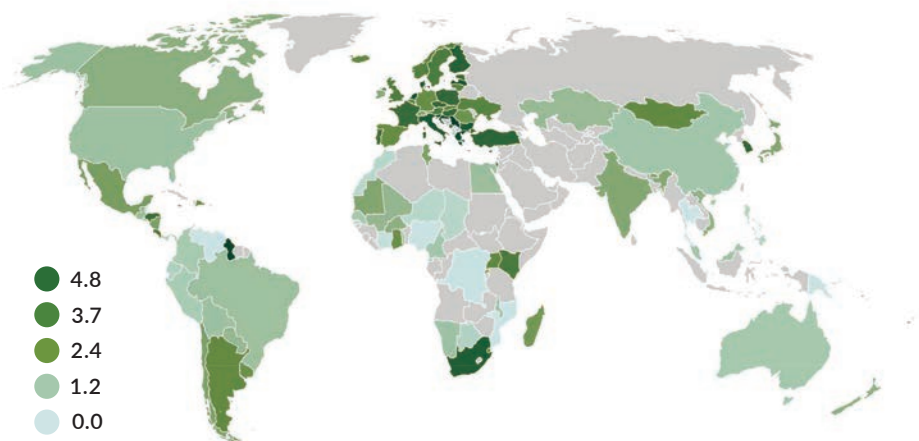
Source: Magyar Nemzeti Bank, based on Goulder (1995)



HOW TAX CAN SAVE THE WORLD

Figure 17.4: Revenue from green taxes as a percentage of GDP (2020)

Source: OECD



Green taxes can also be seen as a geopolitical tool, as their introduction may affect a country's international relations and foreign trade opportunities. The green taxes or customs duties that are imposed can make the import of products into a country more expensive, but the environmental tax burden can also reduce the export competitiveness of a product produced in a country in the medium term, because higher production costs mean that a company providing a product or service can only sell it more expensively on the world market. On the other hand, in many cases, the introduction of various green taxes and fiscal instruments in the framework of national or regional integrations would also require partial harmonisation between countries or integrations in order to achieve the global environmental goals to the greatest extent possible.

NEW TAX REVENUES CAN BE USED TO REDUCE OLD ONES

Green tax revenues still only account for a fraction of gross output and total tax revenues (*Figure 17.4*). **The number of green taxes is growing**, but the revenues from these taxes are equivalent to 1.5 per cent of GDP on average in OECD countries, while **they represent only 5.1 per cent of total tax revenues**. Europe is a leader in green taxation, although the related revenues are still low compared to other taxes.

The best international practices in green taxation and environmental tax instruments include the following:

- ▶ emission trading systems,
- ▶ carbon taxes,
- ▶ pollution charges (e.g. for air, water and soil pollution),
- ▶ deposit fees as social incentives,
- ▶ green corporate tax relief.

The European Union's **Emissions Trading System** (ETS) sets a greenhouse gas emissions cap below which companies can pollute the air in exchange for allowances, and trade unused allowances freely. One allowance allows for one tonne of greenhouse gas emission. The total amount of allowances decrease year by year, based on a pre-determined annual rate, thus approaching the target for the reduction of gas emissions (*Figure 17.5*).

Figure 17.5: Price per tonne of carbon dioxide in the EU Emissions Trading System (ETS)

Source: EMBER

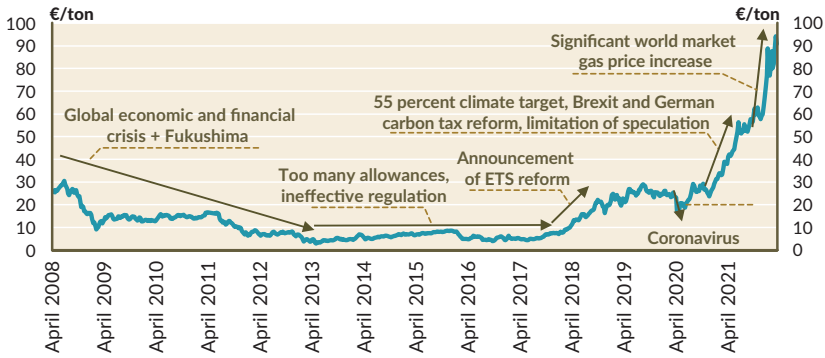
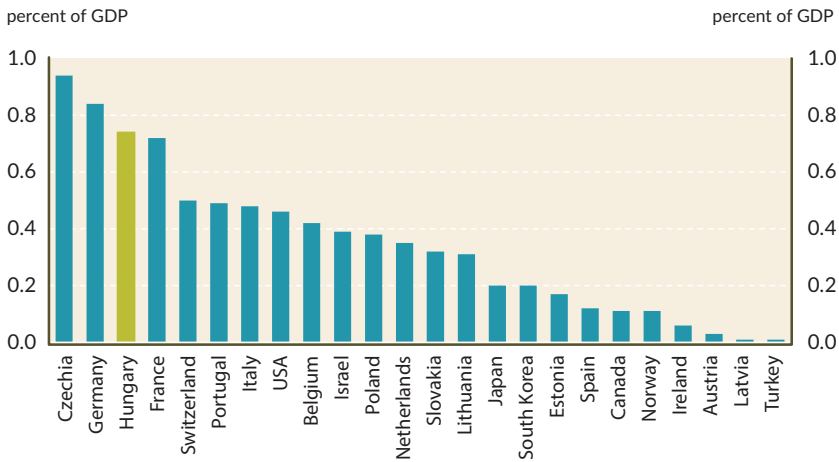


Figure 17.6: Public expenditure on family tax allowances in OECD countries (2017)

Source: OECD



One of the main current debates between the Member States and the EU institutions in relation to the emissions trading system is whether it should be extended to cover road transport and real estate, the financial burden of which would indirectly affect the population as well. However, the EU ETS extension concept seems to lack guarantees to avoid energy price increases. Besides the EU, South Korea and China have also introduced emissions trading schemes for companies.

► **Carbon taxes** differ from emission trading systems in that they regulate the price of the pollutant emitted, not the quantity.

Pollution charges are designed to tax companies directly for their polluting activities. They are also used in Hungary and Estonia, among other countries.

Deposit fees, although paid by the consumers, can be seen as a social incentive, as they are paid back to the consumer in the case of environmentally correct behaviour. This works effectively in both Finland and Germany.

The greening of business activity can be achieved not only through taxes, but also through **partial tax exemptions** for environmentally conscious companies. This tool is used in both the Netherlands and Italy.

FAMILY TAX, TAX FOR FAMILIES

One of the main challenges for a sustainable future tax system in developed countries is the gradual decline of the working-age population. The **favourable treatment and benefits of families and households with children** in the tax system can significantly encourage the population to have children, according to the literature (Figure 17.6). In recent years, more and more countries have focused attention on the **use of negative income taxes for family policy purposes**, with positive effects on eradicating child poverty, improving quality of life, employment and other areas (Garfinkel et al., 2021).



Figure 17.7: Change in the weight of taxes on labour in total tax revenue between 2007–2019 in EU Member States

Source: European Commission

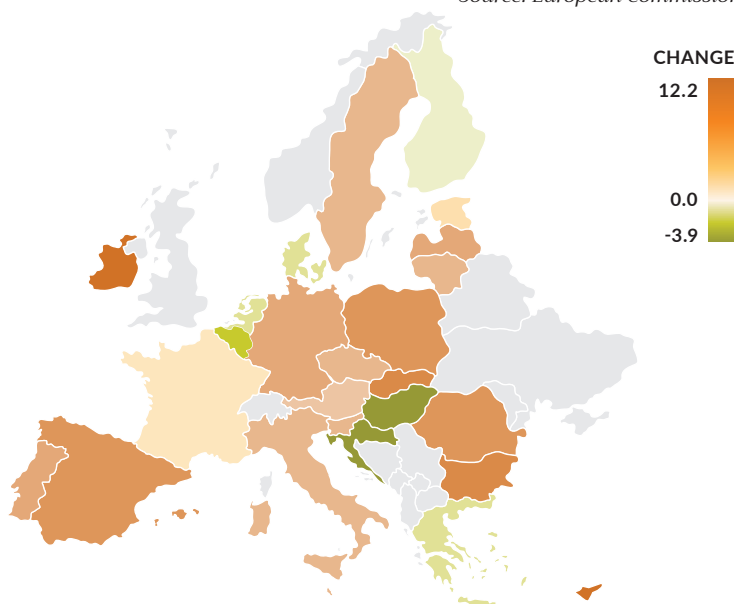
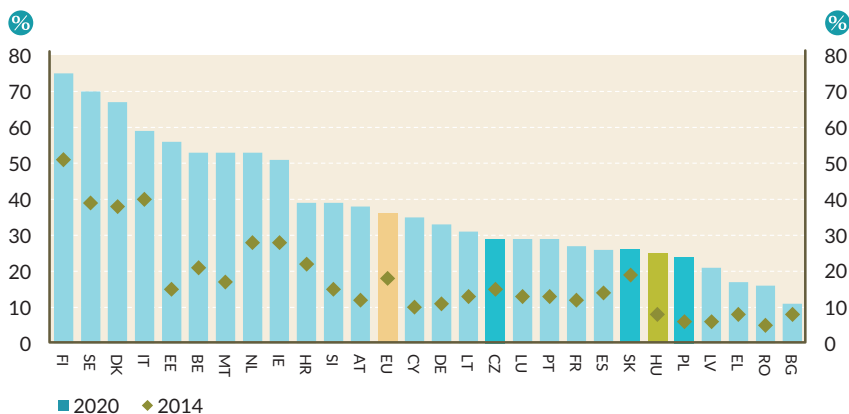


Figure 17.8: Share of companies buying cloud services in non-financial corporations employing more than ten employees in 2014 and 2020

Source: Eurostat



THE KEY TO EFFICIENT RESOURCE ALLOCATION: A PRO-GROWTH AND DIGITAL TAX SYSTEM

The tax system affects economic growth both through the level and the structure of the tax burden. It should be stressed that changes in the tax system not only have an impact during the short-term adjustment process, but also have a long-term impact on the evolution of economic output and thus ultimately on economic sustainability. Based on their impact on economic growth, taxes on labour and on capital have the most distortive effect on the optimal allocation of economic resources, and thus it is reasonable to reduce them (*Figure 17.7*).

Digitalisation also impacts the area of taxation, and tax authorities and policymakers need to respond. Companies in the digital economy have developed new business models that, while operating in parallel with traditional models, also enable them to execute transactions at a much greater scale and distance (*Figure 17.8*). There are several elements in the business practices of companies in the digital economy that facilitate corporate tax avoidance practices, as the legal framework has not kept pace with changes in the economic environment. The international tax reform developed by experts from the OECD and G20 countries could alleviate the tax problem in the near future, but the shortcomings of the reform could work in the opposite direction. In addition to the regulatory challenge, digitalisation also offers opportunities for tax authorities that should be exploited to support growth and sustainability.

REFERENCES

- Garfinkel, I. – Sariscsany, L. – Ananat, E. – Collyer, S. – Wimer, C. (2021): The Costs and Benefits of a Child Allowance. Poverty and Social Policy Discussion Paper. Center on Poverty & Social Policy at Columbia University.
- Goulder, L. H. (1995): Environmental taxation and the double dividend: A reader's guide. *International Tax and Public Finance*, 2, 157-183.

PÉTER GÁBRIEL

STATE AND MARKET
SYNERGIES IN DELIVERING
INNOVATIONS

*“When the wind is strong,
some build walls
and some build windmills.”*

Chinese saying

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



The drivers of long-term economic development are technological advances and continuous innovation. Although in economic thinking innovation is associated with companies, historically and today **the state is one of the main promoters of development.** A wide range of public instruments support innovation, and governments offer various financing opportunities for innovative companies, stimulate public and market demand for innovation and support knowledge sharing. Supporting innovation is a priority for most governments, but there are significant differences in innovation policies across the world's major economies. Due to the highly complex challenges of the 21st century government innovation policies are transforming.

The new global problems are characterised by the fact that the innovations needed to solve them require very large financial resources, and **benefit society as a whole.** This means that innovation can only be financed from public funds. A key trend for the 21st century could be stronger government involvement in defining the purpose of innovation and coordinating the activities of public and private actors in the innovation process.




THE STATE IS AN INDISPENSABLE PART OF THE INNOVATION ECOSYSTEM

One priority for governments is to promote economic development, which is mainly possible through the emergence and spread of innovation. The attitude of economic policy towards supporting innovation has changed significantly over time. While traditionally only the correction of market imperfections has been seen as the role of the government, **key innovation projects are now defined more as a joint mission of public and market actors.**

Governments have a wide range of tools to support innovation (*Table 18.1*). In part, these instruments support supply by reducing the costs of innovation for businesses. Demand stimulating policies, on the other hand, aim to increase market and public demand for innovations, which often achieve significant innovation activity in areas where market demand alone would not be sufficient. Innovation policies vary considerably from country to country. The scope for government to support innovation is limited by the development level of the economy, the amount of resources available, the innovation structure in place and the quality of universities.

Table 18.1:
Elements of the government toolbox to influence innovation

Source: Based on Edler – Fagerberg (2016)

 Very important
 Medium importance
 Moderate importance for the innovation policy orientation and purpose in respect of the listed innovation policy instrument

INNOVATION POLICY INSTRUMENT	ORIENTATION				GOALS				
	SUPPLY	DEMAND	INCREASE R&D	ABILITIES	TRANSFER OF EXPERIENCE	SYSTEM-LEVEL DEVELOPMENT	INCREASE DEMAND FOR INNOVATION	IMPROVE FRAMEWORK	DIALOGUE
1 FISCAL R&D INCENTIVES	Very important		Moderate importance	Moderate importance					
2 DIRECT BUSINESS SUPPORT FOR R&D AND INNOVATION	Very important		Moderate importance						
3 DEVELOPMENT OF ABILITIES	Very important			Very important					
4 DEVELOPING ENTREPRENEURIAL SKILLS	Very important				Very important				
5 TECHNICAL CONSULTANCY	Very important				Very important				
6 SUPPORT FOR CLUSTERS	Very important					Very important			
7 SUPPORT FOR COOPERATION	Very important		Moderate importance		Moderate importance	Very important			
8 INNOVATION NETWORKS	Very important					Very important			
9 STIMULATING MARKET DEMAND FOR INNOVATION	Very important						Very important		
10 PUBLIC PROCUREMENT		Very important	Medium importance				Very important		
11 PRE - COMMERCIAL PROCUREMENT	Moderate importance	Very important	Medium importance				Very important		
12 INNOVATION AWARDS	Medium importance	Medium importance	Medium importance				Medium importance		
13 STANDARDS	Medium importance	Medium importance					Moderate importance	Very important	
14 REGULATION	Medium importance	Medium importance					Moderate importance	Very important	
15 IDENTIFYING TECHNOLOGY TRENDS	Medium importance	Medium importance							Very important

THE DOMINANCE OF THE UNITED STATES INNOVATION SYSTEM IS GRADUALLY WEAKENING

The United States has traditionally been one of the most innovative economies, and therefore serves as a benchmark for many economies. In line with the traditionally **pro-market economic philosophy** in the United States, governments primarily used to rely on the market to finance innovation and **have had little direct involvement in the innovation process.**

However, the Second World War brought about a huge change in this respect. **Large, centralised research institutes were set up to support innovation in many industries, such as electronics, pharmaceuticals, and aerospace.** The threat from the Soviet Union continued to drive up government expenditures on innovation, with the US federal government spending more on innovation in the early 1960s than governments and businesses in all other countries combined (Atkinson, 2020). The huge spending in many key industries resulted in global technological superiority for the United States.

The US economy seemed to have no rival in the 1990s, but **since the 2000s US innovation dominance has been declining.** It has happened several times in the past that the global competitors of the United States strengthened, but this led the US government to support innovation more and more effectively, and consequently the technological takeover has so far failed to occur. The country's financial resources and innovation capacity even now provide an opportunity to reform the US innovation system, leaving open the question of whether the weakening of its global position will continue in the future or the trend may reverse.

Figure 18.1: Intensity of using industrial robots and how it has changed in China compared to the United States (2009, 2017)

Source: Atkinson & Foote (2019)

Note: The number of industrial robots in China per employee and the number of newly installed robots compared to the United States (United States = 100 per cent)

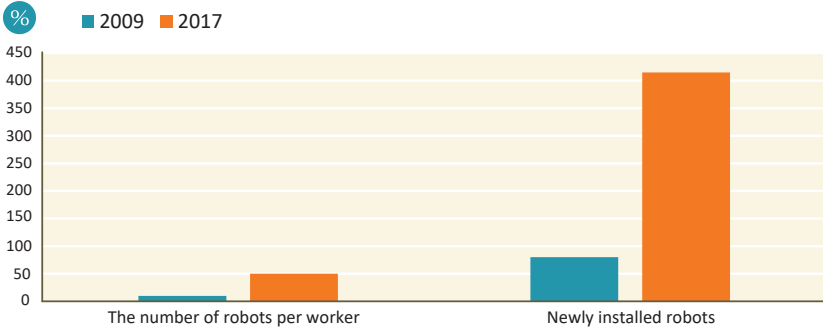


Figure 18.2: R&D expenditure in European countries, at purchasing power parity, average 2000–2018

Source: Based on Eurostat, own compilation

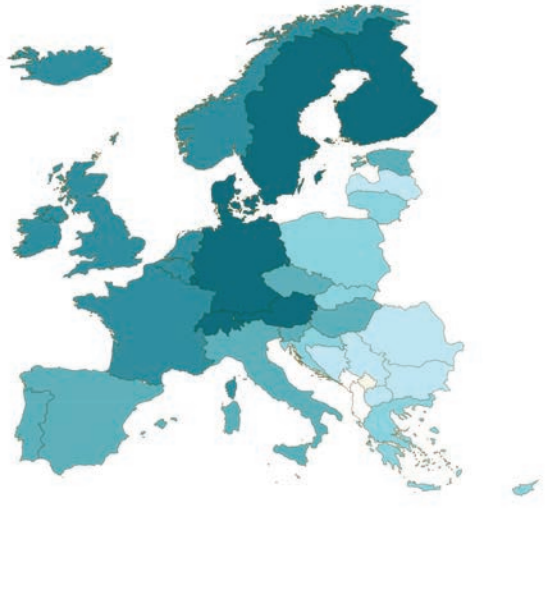
The colours represent quintiles.

The darkest colour indicates the highest R&D expenditure per capita.

No data available for Albania, Kosovo, and Montenegro.

Purchasing power parity, calculated at 2005 prices.

R&D expenditure per capita is lowest in North Macedonia (17 units) and highest in Switzerland (1,073 units).



CHINA HAS JOINED THE LEADING ECONOMIES IN TERMS OF INNOVATION CAPACITY AS WELL

China's emergence as a major innovator has been a development of global significance in recent decades. The Chinese government is investing huge resources to improve the innovation structure and support innovative projects. Indicators tracking innovation performance show that the gap to the US is narrowing very rapidly.

China's innovation strategy is based on active state support. For decades, Chinese innovation was based mainly on the adoption of advanced technologies, following the strategy of other Asian countries that successfully converged in the past. The technological catching-up of the Chinese economy in strategic sectors is impressive. One good example is the promotion of the use of industrial robots, where the gap to the United States was nearly halved in a decade (*Figure 18.1*).

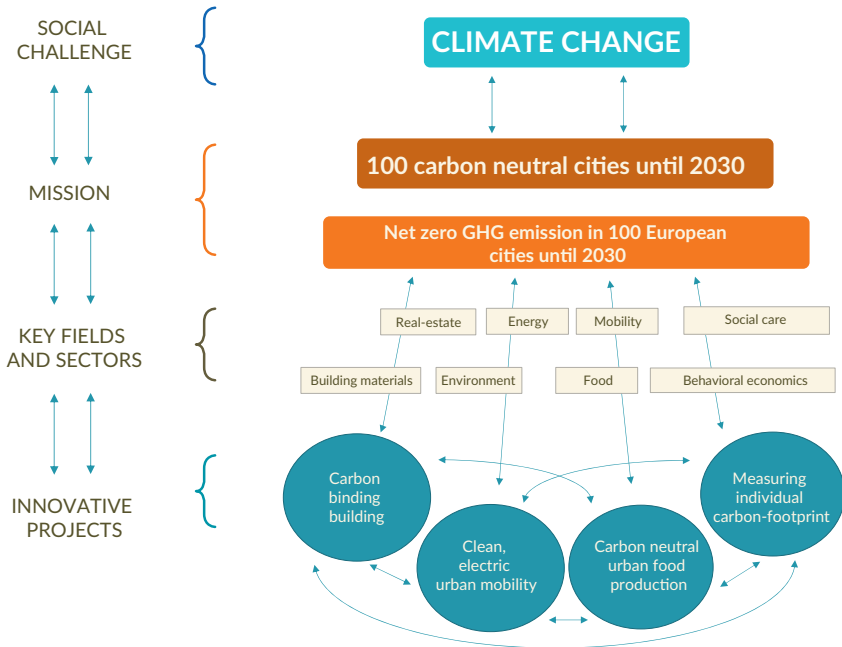
The technological catching-up of the Chinese economy may continue. This is supported by the fact that the Chinese government has much more flexibility than Western governments in terms of allocating and focusing its financial resources on prioritised innovation projects. The Chinese economy also benefits from a more lenient regulatory environment. As a result of the flexibility in the use of personal data, China has already come close to the United States in the field of AI-based innovations, for example.

A MORE EFFECTIVE INNOVATION POLICY IS NEEDED IN THE EUROPEAN UNION

In the European Union, both the Member States and the Union itself have their own innovation policies. National innovation policies are highly heterogeneous in terms of both size and quality. Some European countries are among the world's top innovators, but the EU also has many underperforming Member States in terms of innovation. The east-west divide in innovation capacity can be well identified. The old EU Member States allocate far more resources to innovation than the new ones (*Figure 18.2*).

Figure 18.3: A hypothetical mission to reduce urban emissions

Source: Mazzucato (2018)



The innovation policies pursued by the Member States are not efficient. Despite institutions at the Community level, the European Union's innovation system remains fragmented, dominated by national, and often sectoral, innovation policies. The Horizon 2020 programme is an effort trying to change this. In this context, the European Innovation Council, set up in 2018, will allocate innovation funding not only based on the quality of individual proposals, but also in relation to innovation missions. A key question for the European Union's global economic position is the extent to which it can build an effective Community-level innovation system that can coordinate the operation of national innovation capacities. If successful, this could halt the decline in Europe's global importance.

THE PROLIFERATION OF MISSION-ORIENTED INNOVATION POLICIES WILL FURTHER INCREASE THE ROLE OF THE STATE

In the 21st century, humanity faces challenges that cannot be solved by market-based solutions alone. Climate change, demography, poverty, health, and inclusive growth are all issues that are highly complex, affect large systems, require a multi-disciplinary approach and on the top of that, are urgent. Mission-oriented innovation policy can be a tool to address these complex problems. Mission-oriented innovation policy means that the government not only provides additional resources to boost innovation activity, but also defines the main purpose of innovation, the steps needed to achieve it, and continuously coordinates and monitors the activities of the participants throughout the innovation process.

The complexity of the mission-oriented innovation policy is well-illustrated by a hypothetical European mission to slow climate change (Figure 18.3). The mission has a well-defined, measurable goal of achieving zero emissions in 100 European cities by 2030 (based on Mazzucato, 2018). Achieving this requires parallel innovation and cooperation between many actors. Innovation is needed in fundamental research, applied research and in regulation. It also requires the collaboration of researchers, engineers, economists, data analysts and many others.

As with the Zero Emissions Mission to slow climate change, similar missions could be launched, involving a wide range of stakeholders to tackle other major societal challenges.



***“THE SECRET OF CHANGE IS TO FOCUS
ALL OF YOUR ENERGY, NOT ON FIGHTING
THE OLD, BUT ON BUILDING THE NEW.”***

SOCRATES



THE IMPORTANCE
OF STATE-FUNDED
INNOVATION

REFERENCES

- Atkinson, R. D. (2014): Understanding the US National Innovation System. The Information Technology & Innovation Foundation, June 2014. Retrieved 15 May 2020
- Atkinson, R. D. – Foote, C. (2019): Is China Catching Up to the United States in Innovation?, Information Technology and Innovation Foundation (ITIF) Report.
- Fresco, L. et al. (2015): Commitment and Coherence. Ex-Post-Evaluation of the 7th EU Framework Programme (2007-2013), European Commission
- Edler, J. – Fagerberg, J. (2016): Innovation Policy: What, Why & How, Working Papers on Innovation Studies 20161111, Centre for Technology, Innovation and Culture, University of Oslo.
- Mazzucato, M. (2018): Mission-oriented innovation policies: challenges and opportunities, *Industrial and Corporate Change*, Oxford University Press, Vol. 27(5), pages 803-815.
- Rodríguez-Pose, A. (2020): The Research and Innovation Divide in the EU and its Economic Consequences. In European Commission: Science, Research and Innovation Performance of the EU 2020. A Fair Green and Digital Europe. Brussels: European Commission, 676-707.
- Shapira, P. – Youtie, J. (2010): The innovation system and innovation policy in the United States, In *Competing for global innovation leadership: Innovation systems and policies in the USA, EU and Asia*, eds. R. Frietsch and M. Schüller.

DÁVID PAPP,
BALÁZS SÁRVÁRI,
MÁRTON VARGA

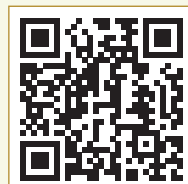
SUSTAINABLE FINANCE

The new linkage between
the financial system
and sustainability

*“Nature is big, man is small; the quality
and level of human life has always
depended on man’s relation to nature,
on the measure in which he is
able to understand nature and
use its forces for his advantage.”*

Albert Szent-Györgyi

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



The notion of sustainable development has been part of economic thinking for decades, but the vast environmental damage caused by the global economy has still not yet been substantially reduced. **Through its economic impacts, climate change also threatens the stability of the financial system** and has direct and indirect effects on price stability. **Reorganisation of the financial system and the transformation of financial institutions are needed** to make them more resilient and able to support the urgent green economic transformation. There is also work to be done in the area of monetary policy: central banks need to pursue sustainability considerations while maintaining and ensuring price stability.

FOR THE TRANSITION TO A SUSTAINABLE ECONOMY, TRANSFORMATION OF THE FINANCIAL SYSTEM IS NEEDED

The capital allocation function of the financial system is essential to achieve environmental sustainability. Environmental sustainability, as a global societal goal, implies an unprecedented economic transformation. Achieving climate neutrality, a key environmental objective, requires radical reform of energy systems, transport, agriculture and resource and material-intensive industries in just a few decades (Figure 19.1). The financial system has played a crucial role in the exponential growth in economic welfare measured in global GDP over the last hundred years and will continue to play at least as important role in the sustainable transition.

The financial system has a huge impact on the natural environment, and vice versa: it is now clear that the state of the environment also has a significant impact on the financial system. Economic shocks, whether of, physical or transitional nature, spiral into the financial system via multiple channels, threatening its stability and efficient functioning (Figure 19.2). Such risk is no longer is negligible.



THE INTERNATIONAL
ENERGY AGENCY'S ROADMAP
FOR CARBON NEUTRALITY
IN ENERGY SYSTEMS

Figure 19.1: Annual investment needs for the decarbonisation of energy systems and land use

Source: McKinsey (2022)

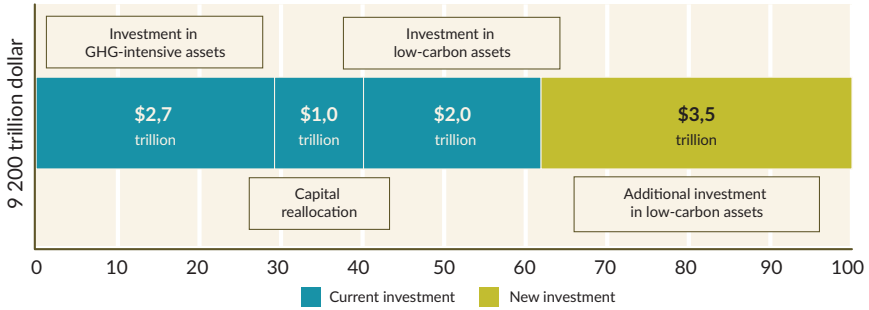
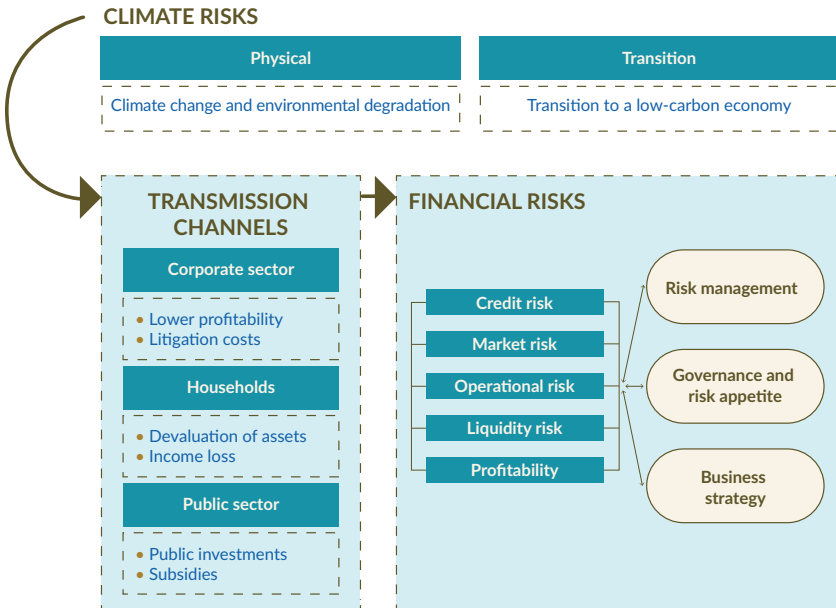


Figure 19.2: Climate risks (adaptation, physical, channels)

Source: Own compilation



WITHOUT A GLOBAL GREEN ECONOMIC POLICY, THE FINANCIAL SYSTEM WILL NOT BE ABLE TO PLAY ITS ROLE

The financial system alone will not be able to achieve the global sustainability goals: it will only be effective if it is complemented by governments' economic policies. The most effective policy instruments for a green economic transformation are of fiscal nature. The most essential instruments are aimed at passing on the societal costs of harmful environmental effects (negative externalities) to the economic actors that cause them.

Achieving sustainability goals in the coming decades will require coordinated action. Key sustainability indicators, such as the level of greenhouse gas emissions, need to be treated with the same significance as key macroeconomic indicators: inflation, unemployment and gross domestic product. Central banks experienced in managing inflation can serve as a good example of how a reliable, consistent “set of rules” can successfully serve a societal objective (which in the case of central banks is primarily to achieve and maintain price stability) through the expectations of economic agents.

INFORMATION AND DATA ARE CRITICAL RESOURCES FOR GREENING THE FINANCIAL SYSTEM

To ensure that sustainability considerations are reflected in the capital allocation decisions of financial institutions, **the sustainability disclosures and reporting of businesses need to be strengthened.**

Due to recent years' efforts, disclosure standards are now available that provide adequate information on environmental impacts and the management of environmental risks. The disclosure recommendations developed by the Task Force for Climate-related Financial Disclosures (TCFD) is an important example (*Figure 19.3*).

In the short term, the objective is to significantly increase the number of reporting entities, including small and medium-sized enterprises. One possible way to achieve this is to eventually make **standardised, universally accepted sustainability reporting mandatory**. Ultimately, sustainability reporting should reach the level of sophistication as seen in accounting reports. This parallel not only applies to content, but also to the organisational and institutional framework for producing and validating such reports.

Figure 19.3: Four main areas of the climate risk report

Source: Own compilation



Figure 19.4: The dimensions of green supervisory expectations: strategy, corporate governance, risk management and reporting

Source: Own compilation



THE REFORM OF FINANCIAL INSTITUTIONS IS ON THE HORIZON

Most financial institutions do not yet take into account climate and environment-related financial risks adequately. The most adverse impacts will occur in the longer term, in the lives of future generations. This time horizon is outside the planning horizon of companies and financial institutions.

Driven by the expectations of shareholders and customers, many financial institutions have recognised the need to move beyond traditional, short-term, one-dimensional institutional frameworks constructed for financial gain. But this is merely not enough on the system level; such organic development is insufficient. Regulatory action is necessary to ensure that all institutions take into account long-term and short-term environmental risks. Institutional reform is imminent and affects the entire institutional framework of financial institutions: corporate governance, risk management, business planning and reporting (*Figure 19.4*).

GREEN FINANCING COULD ENABLE BEST BUSINESSES OF THE CENTURY

Sustainability is not only a challenge, but also an unprecedented business opportunity. Next to risks of transition, there are also immense opportunities. It is apparent that industries and companies that apply sustainable technologies will thrive during a green economic transition. Also in the finance industry, first movers can achieve above-average returns. The driving force can come not only from financial gain, but also from reputational advantage.

Sustainable finance is dynamically growing (Figures 19.5 and 19.6), but there exist still **a huge investment and financing gap**. At present, the further growth of sustainable financing is severely constrained by several factors. One of the most important issues to be addressed is which economic activities really contribute to sustainability goals. Without such a global definitional framework, there is a risk of misallocation of capital and deliberate greenwashing.

Figure 19.5: Sustainability-related debt instruments
(USD billion)

Source: BloombergNEF (2022)

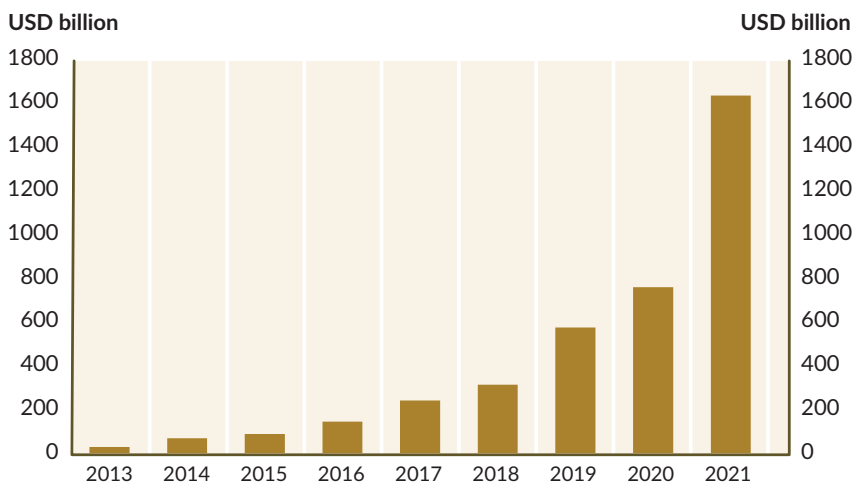
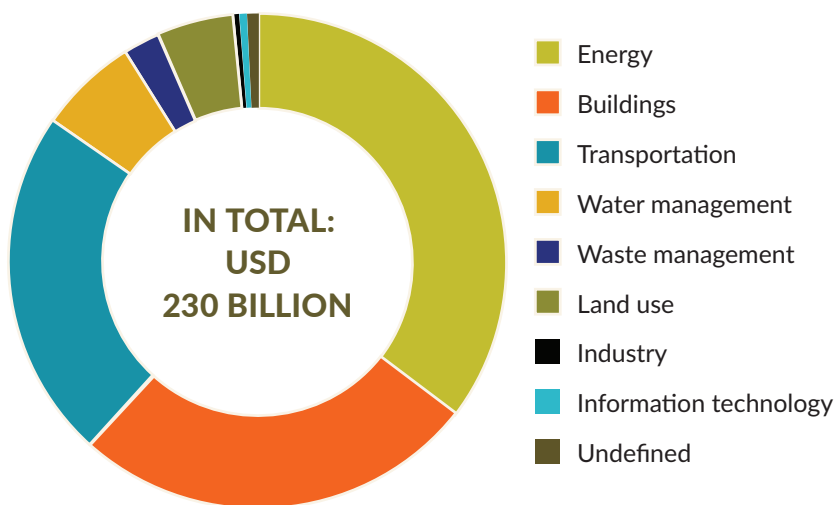


Figure 19.6: Breakdown of investments financed by green bonds (by CBI standard)

Source: Climate Bonds Initiative (2022)



Another very serious constraint is the **still excessively high cost of sustainable technologies**. Green technologies are typically capital-intensive technologies. Many such crucial technologies are not yet mature enough. Additionally, mature green technologies are often still less competitive to their polluting counterparts. Through innovation and economies of scale, there is evidence that the costs of technologies can be reduced to a level where cost-competitiveness bring green solutions into play. **Financing a sustainable economy requires greater cooperation between the state and the financial markets.**

MONETARY POLICY FACES NEW CHALLENGES

Environmental risks also threaten the objectives of monetary policy. Extreme environmental events can disrupt agricultural activity, global warming and the adverse health effects of heatwaves can reduce labour supply. The increasingly intense supply shocks could lead to an increase in price volatility and thus directly threaten the primary central bank mandate. Natural disasters can lead to a weakening of the financial intermediary system via an increase in non-performing loans, the depreciation of collateral and a change in risk appetite. The existence of a stable financial intermediary system that correctly assesses and takes into account the environmental risks is a prerequisite for effective monetary policy implementation. Finally, it is important to note that, from a monetary policy perspective as well, it is crucial to define the necessary time horizon and to take the appropriate steps in a timely manner.

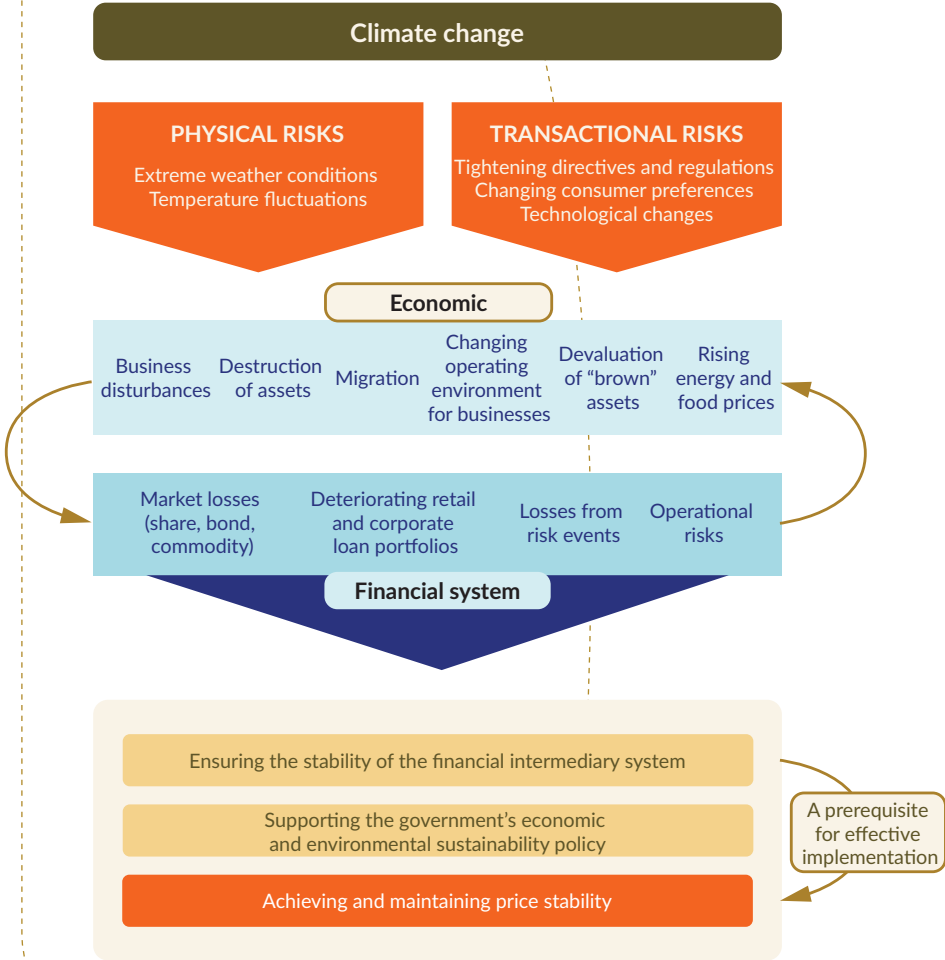
THE MNB LEADS THE FIGHT AGAINST CLIMATE CHANGE WITH UNIQUE SOLUTIONS

Sustainability aspects have been integrated into the Bank's supervisory strategy via the Green Programme, which was launched in 2019. The programme focuses on measures aimed at environmental risk assessments, financial system stability and enhancing the environment for green financing. The specific measures include a long-term climate stress test, a green supervisory expectations for credit institutions to address climate risks and green support factor in banks' capital requirements.

It is a unique milestone that, **following the Parliament's decision in May 2021, the MNB's mandate has been extended to support the government's environmental sustainability policy.** This means that,

Figure 19.7: Impacts of climate change on the MNB's primary and secondary objectives

Source: Own compilation



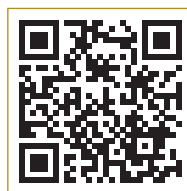
in addition to expressing the importance of preserving the environment, the objectives set out in the Central Bank Act are also a call to action. The foundations of such actions were laid down by the central bank's Green Monetary Policy Toolkit Strategy, which provides a coherent framework for how the central bank can translate climate protection and environmental sustainability into its monetary policy instruments. Implementation of the new strategic direction started with the announcement of two pioneering initiatives: the FGS (Funding for Growth Scheme) Green Home Programme and the Green Mortgage Bond Purchase Programme. Both programmes focus on renewing the housing stock and increasing its energy efficiency, which is of paramount importance for both the national economy and climate change mitigation. A monetary policy turnaround based on sustainable foundations is underway, and the MNB is on a mission to lead by example and play an active role among central banks in supporting the transition to a low-carbon economy. It was in this spirit that the MNB published its climate risk report in line with the TCFD recommendations in spring 2022.

REFERENCES

- BloombergNEF (2022): Sustainable Debt Issuance Breezed Past \$1.6 Trillion in 2021. <https://about.bnef.com/blog/sustainable-debt-issuance-breezed-past-1-6-trillion-in-2021/> Download date: 3 February 2022
- Carney, M. (2015): Breaking the tragedy of the horizon – Climate change and financial stability. <https://www.bis.org/review/r151009a.pdf>. Download date: 8 September 2021
- Climate Bonds Initiative (2022): Interactive Data Platform. <https://www.climatebonds.net/market/data/> Download date: 3 February 2022
- Group of Thirty (2020): Mainstreaming the transition to a net zero economy. <https://group30.org/publications/detail/4791> Download date: 1 November 2021
- McKinsey (2022): The net zero transition: What it would cost, what it could bring. <https://www.mckinsey.com/business-functions/sustainability/our-insights/the-net-zero-transition-what-it-would-cost-what-it-could-bring> Download date: 3 February 2022



THE MNB'S
CLIMATE-RELATED
FINANCIAL
DISCLOSURE



CLIMATE CHANGE
AND FINANCIAL
STABILITY - SPEECH
BY MARK CARNEY

FERENC TÓTH

INCOME AND WEALTH INEQUALITIES

*“Excessive and widening
income and wealth inequalities
are holding back sustainable
growth and convergence.”*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



One important aspect of sustainability is the extent and evolution of income and wealth inequalities and the economic policies that affect them. In recent decades, income inequality has increased in the world's developed countries as a result of the relaxation of market regulations, globalisation and technological progress. Greater inequality is associated with **reduced mobility between income classes**, i.e. in a more unequal society, it is more common for the poor to remain poor and the rich to remain rich. **Excessive, unjustified inequality limits the development of the potential in people both as individuals and as a whole, in terms of human capital at the level of the national economy.** With the right level of public intervention, social mobility between income levels can be improved, which can make a tangible contribution at the macroeconomic level to maintaining social peace, increasing social welfare and strengthening convergence, while ensuring sustainable growth.

THE LEVEL OF INEQUALITY HAS INCREASED IN DEVELOPED COUNTRIES

The distance between the two edges of the income and wealth distribution is the measure of income and wealth inequality. Income and wealth inequalities can be examined within a state and between countries. Income and wealth inequalities between countries are significantly higher than inequalities within countries. **According to 2018 data, the world's richest one per cent own nearly half of the world's reported wealth.**

In the developed countries, market deregulation, increasing globalisation and technological progress are increasing inequality, which is already a constraint on the growth potential of advanced economies. **Market deregulation has allowed for an increasing concentration of capital and the rise of ever bigger and more profitable large corporations.** Profit accounts for an increasing share of the income generated. The main beneficiaries of the increasing concentration of capital are the managerial class, while the losers are the middle-income corporate employees (Gabaix – Landier, 2008).



GLOBAL WEALTH
INEQUALITY

Figure 20.1: Income share of the top one per cent and its components in the US

Source: Atkinson-Piketty-Saez (2011)

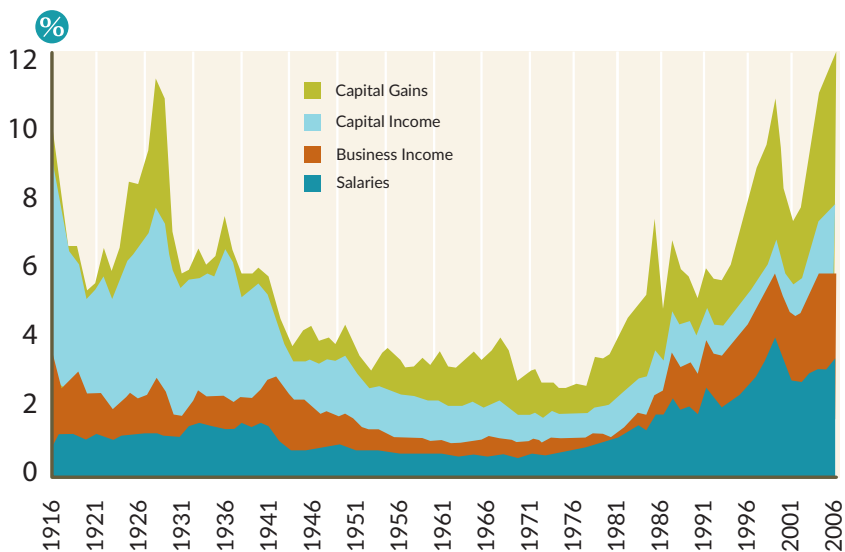


Figure 20.2: Wealth distribution: perception and reality in the US

Source: Norton – Ariely (2011), infographic: Skewed: Income Inequality in America | Visual.ly

Note:

In the actual wealth distribution, the bottom 40% is almost impossible to depict

US population divided into 5 equal parts



IDEAL distribution of wealth according to the respondents



Real distribution of wealth according to their ESTIMATE



Actual distribution of wealth



Poverty has increased among young adults and families with children. On average, the richest 10 per cent of households in the OECD countries own more than half of household wealth, and this share has increased in two-thirds of the countries since 2010 (OECD, 2021). **The concentration of wealth is twice the level of income inequality:** in the 28 OECD countries, the richest 10 per cent of households own 52 per cent of total household wealth on average, while 60 per cent of the least wealthy households own just over 12 per cent (Balestra – Tonkin, 2018).

Increased international trade has opened the door to the replacement of lower-skilled Western labour with Eastern workers, further widening income differences in these countries. This has had a detrimental impact on middle-income earners who have worked in, and accumulated skills and knowledge in, industries that have migrated to emerging markets.

Technological innovations in developed countries are creating higher-skilled jobs, increasing the income advantage of the more highly skilled layer and thus the inequality. Technological developments favouring skills, with advances in artificial intelligence and robotics, are already threatening demand for labour in higher-skilled occupations and will do so increasingly in the future, further widening the income gap between the two ends of the income distribution (Acemoglu – Restrepo, 2020).

THE NEGATIVE CONSEQUENCE OF INEQUALITY IS WEAKENING SOCIAL COHESION

The resulting inequality has serious social consequences. We know from decades of experience in the malfunctioning of the socialist system that excessive egalitarianism is not healthy, as it stifles creativity and individual motivation, and reduces the potential for breakthroughs. Those who work more and better should earn more. This is right in itself, and the resulting inequality is not harmful, as it is these people who drive society forward. **It is not the equality of earnings that is important, but the degree of inequality on the one hand, and equal opportunities on the other, especially for children.**

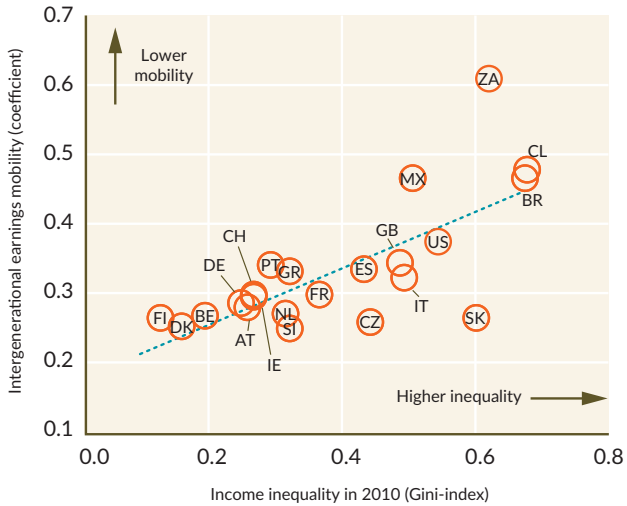
**EXCESSIVE INEQUALITY HAS
A NEGATIVE IMPACT ON WELFARE,
COMPETITIVENESS, SUSTAINABILITY,
GROWTH AND SOCIAL PEACE.**

Figure 20.3: Income inequality in 2010 (Gini index) Link between income inequality and social mobility

Source: UNI-WIDER World Income Inequality Database, EqualChances.org



UNDERSTANDING
THE GINI
COEFFICIENT



**SOCIAL MOBILITY IS HIGHER
IN COUNTRIES WITH RELATIVELY
LOWER LEVELS OF INEQUALITY.**

Excessive inequality has a negative impact on welfare, competitiveness, sustainability, growth and social peace. **It follows from the above that there is a socially acceptable level of inequality that contributes to the development of society and to the growth of prosperity.** Inequality affects social mobility, which is the extent to which people are able to move between income levels. The greater the social mobility in an economy, the greater the chance of moving from the poor to the rich or from the rich to the poor. **Social mobility is higher in countries with relatively lower levels of inequality** (Rippel – Várhegyi, 2019).

A more unequal society will exacerbate political tensions between social classes, which could lead to tax increases. Higher redistribution on the other hand slows economic growth by reducing the incentives for development (Alesina – Rodrik, 1994).

Whether it results from economic downturns, epidemics or other causes, **excessive inequality weakens social cohesion and reduces social mobility between income levels.** The result is that some layers of society have low incomes that can limit their livelihoods and the opportunities for their children to advance. In the absence of a vision for the future, this state of affairs could sooner or later lead to a breakdown of social peace, which could have a detrimental effect on all levels of society, undermining the development and prosperity of society as a whole and of the national economy.

ECONOMIC POLICIES CAN MITIGATE THE HARMFUL EFFECTS OF EXCESSIVE INEQUALITY

Optimal or sustainable levels of inequality are difficult to define, but excessive inequality has serious welfare costs. The market in itself tends to increase inequalities, so it is appropriate for public intervention to reduce them to a level below that set by the market. Temporary, reasonable state intervention in market processes is particularly justified in the event of economic downturns and epidemics. Economic policies have an important role to play in reducing the negative effects of inequalities. **State regulation, redistribution of income and a well-targeted support system can help optimise income conditions.** Support can take many forms, with a particular emphasis on support for families, such as family allowances, maternity leave, childcare benefits, housing support for those with children or intending to have children, support for access to work, support for research and development and vocational training.

**STATE REGULATION,
REDISTRIBUTION OF INCOME
AND A WELL-TARGETED SUPPORT
SYSTEM CAN HELP OPTIMISE
INCOME CONDITIONS.**

Figure 20.4: Differences in household income inequalities before and after taxation and public transfers, 2018

Source: OECD Income Distribution Database



We now know that **childhood well-being is a key determinant of adult well-being, the children's future adult earnings and health.** The state aims to improve opportunities for families, especially children, and to reduce child poverty, in order to improve their chances and allow them to develop and be recognised on their own merits as adults.

Income inequalities may require a government to redistribute incomes to increase the welfare of large numbers of people at the expense of smaller numbers of higher income earners. The state can do this primarily through the tax system and social transfers. **In all countries, after-tax inequality is lower than inequality calculated based on pre-tax, market-based incomes.**

There are also many other ways to reduce inequalities other than direct income redistribution. Quality public services, such as health or education, can also be powerful tools for reducing inequality.

Over the last decade, universal basic income has been increasingly raised as a possible economic policy response. However, this would be a step backwards compared to today's targeted welfare state benefits, and its budgetary impact would be extremely high. Basic income also reduces the source of economic growth, the willingness to work.

Experience shows that a **higher employment rate is more effective than social assistance in reducing income inequalities.** A more promising concept is the **job guarantee.** The principle allows the state to offer jobs in the public sector as an “Employer of Last Resort” (similar to the Lender of Last Resort function of central banks). Compared to the basic income, it has the advantage of providing jobs, so it prioritises living on earned income rather than benefits, and thus also prevents human capital from being eroded by unemployment, and – with supportive training – it can even be used to increase human capital.

Excessive income and wealth inequalities hamper sustainable growth and convergence.

Too much inequality leads to less social mobility between income classes, which limits the development of the inherent potential in people.

Excessive inequality weakens social cohesion, reduces social mobility between income levels and can lead to a breakdown of social peace.

ECONOMIC POLICIES CAN MITIGATE THE HARMFUL EFFECTS OF EXCESSIVE INEQUALITY



REFERENCES

- Acemoglu, D. – Restrepo, P. (2020): Robots and jobs: Evidence from US labor markets. *Journal of Political Economy*.
- Alesina, A. – Rodrik, D. (1994): Distributive politics and economic growth. *The Quarterly Journal of Economics*, 109(2), 465-490.
- Atkinson, A. B. – Piketty, T. – Saez, E. (2011): Top incomes in the long run of history. *Journal of Economic Literature*, 49(1), 3-71.
- Balestra, C – Tonkin, R. (2018): Inequalities in household wealth across OECD countries: Evidence from the OECD Wealth Distribution Database, *OECD Statistics Working Papers 2018/01*.
- Gabaix, X. – Landier, A. (2008): Why has CEO pay increased so much? *The Quarterly Journal of Economics*, 123(1), 49-100.
- Norton, M. I. – Ariely, D. (2011): Building a better America One Wealth Quintile at a Time. *Perspectives on Psychological Science*,
- OECD (2021): *Inequalities in Household Wealth and Financial Insecurity of Households, Policy Brief*.
- Rippel, G. – Várhegyi, J. (2019): Egyenlőtlenségek és gazdasági növekedés a 21. században (Inequalities and economic growth in the 21st century). In: B. Virág (ed.) (2019): *A jövő fenntartható közgazdaságtana*” (Sustainable economics of the future). Magyar Nemzeti Bank.

ÁGNES HORVÁTH-HAJZER,
ERIKA CSONGRÁDI,
SZILVESZTER TORDAI

DATA PROTECTION AND THE REGULATION OF NETWORK MONOPOLIES

*“Some people see innovation
as change, but we have never
really seen it like that.
It’s making things better.”*

*Tim Cook,
CEO of Apple*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



Digitalisation has ushered in a new era of network monopolies which need to be monitored closely from the aspect of both economic and social sustainability. This chapter briefly describes the EU regulatory proposals for network monopolies from a data protection and competition law perspective. Our vision is that the regulation of network monopolies can serve the objectives of both consumers and market competition well, on a holistic basis, and with the committed and close cooperation of data protection and competition authorities. We outline the possible consequences of the emergence of network monopolies in financial markets, based on our competences as a central bank, and draw attention to the need to amend the existing financial regulatory framework. Finally, as a possible example to follow, we look at how regulatory and non-regulatory solutions helped to increase competition in a similarly concentrated network market for credit card providers.

IF YOU THINK IT'S FREE, YOU'RE THE PRODUCT

Although they often seem free to use, we are actually paying for the services of the big platform providers with our data, because every movement of the cursor and every click can be stored. The data can then be analysed to identify consumer needs, wants, preferences and behaviours, and purchasing motives. As in the case of oil refining: the data is “refined” into a resource, in the right amounts, after algorithmic analysis, to make the given platform provider an unavoidable, dominant player in the market.

So in practice, we pay for online platform services with our data. But can data be a means of payment, a form of consideration at all? It seems very much so, as billions of people have already adopted it as a medium of exchange. From this point onwards, it is the responsibility of the regulator to create a regulatory framework to protect consumers, which allows for the informed management of data by individuals in the world of data as a means of payment.

The European Commission's five-year data strategy published in 2020 sets out its objectives for policy actions and investments to create the conditions for a data economy, and provides an overview of how the European Union can reap the benefits of the better use of data to help boost productivity and market competition.

The draft European Data Governance Act prepared under the European strategy for data would create the possibility for people to trade their data as they see fit, i.e. BigTech companies would pay data subjects directly for their data, moving away from Big Data towards Good Data. This would help everyone to understand and see the value of their personal, statistical, meta- and other data, so that users would be more aware of the conditions under which they sell their data, to whom and for how much, and businesses could use data in a clearer framework than at present, with a more level playing field.

Figure 21.1: Picture elements related to the draft European Union regulation on data governance

Source: Commission of the European Union, translation: MNB

EXAMPLES OF INDUSTRIAL AND COMMERCIAL DATA USE



Jet engines filled with thousands of sensors collect and transmit data back to ensure efficient operation.



Wind farms use industrial data to reduce visual impact and optimise wind power.



Real-time traffic avoidance navigation can save up to €730 million hours. This represents up to €20 billion in labour costs.



Real-time notification of delayed trains can save 27 million working hours. This amounts to €740 million in labour costs.



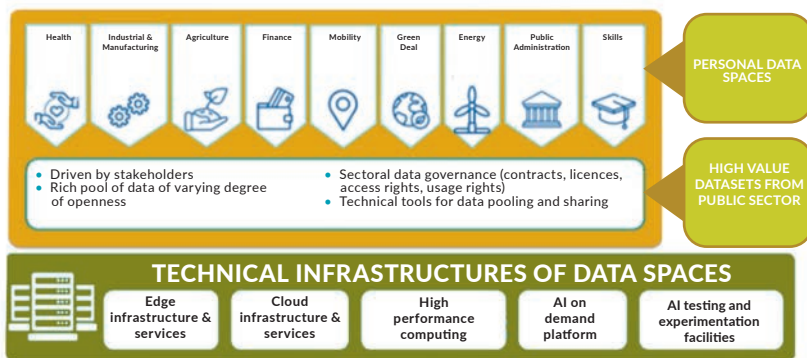
Better allocation of resources to fight malaria could save up to €5 billion in health care costs globally.



SHAPING EUROPE'S DIGITAL FUTURE

Figure 21.2

Source: Commission of the European Union, translation: MNB



THE NEED FOR A HOLISTIC APPROACH TO COMPETITION AND DATA PROTECTION RULES

The European Union is planning to adopt an ex-ante regulation to regulate the activities of network monopolies and protect competition in the market: the draft Digital Markets Act aims to create a self-executing, horizontal regulation that will effectively complement existing ex-post EU antitrust rules for the activities of platform providers. As we highlighted earlier, personal data is the alpha and omega of digital markets. Data protection has therefore become a competition law issue, and data protection and competition law can no longer be treated separately. Based on the above, as in the rest of the world, regulatory proposals for network monopolies in the European Union can only be successful if they are based on the closest cooperation between data protection and competition authorities.

THERE IS A GROWING NEED FOR COMPLEX REGULATORY SOLUTIONS IN FINANCIAL MARKETS AS WELL

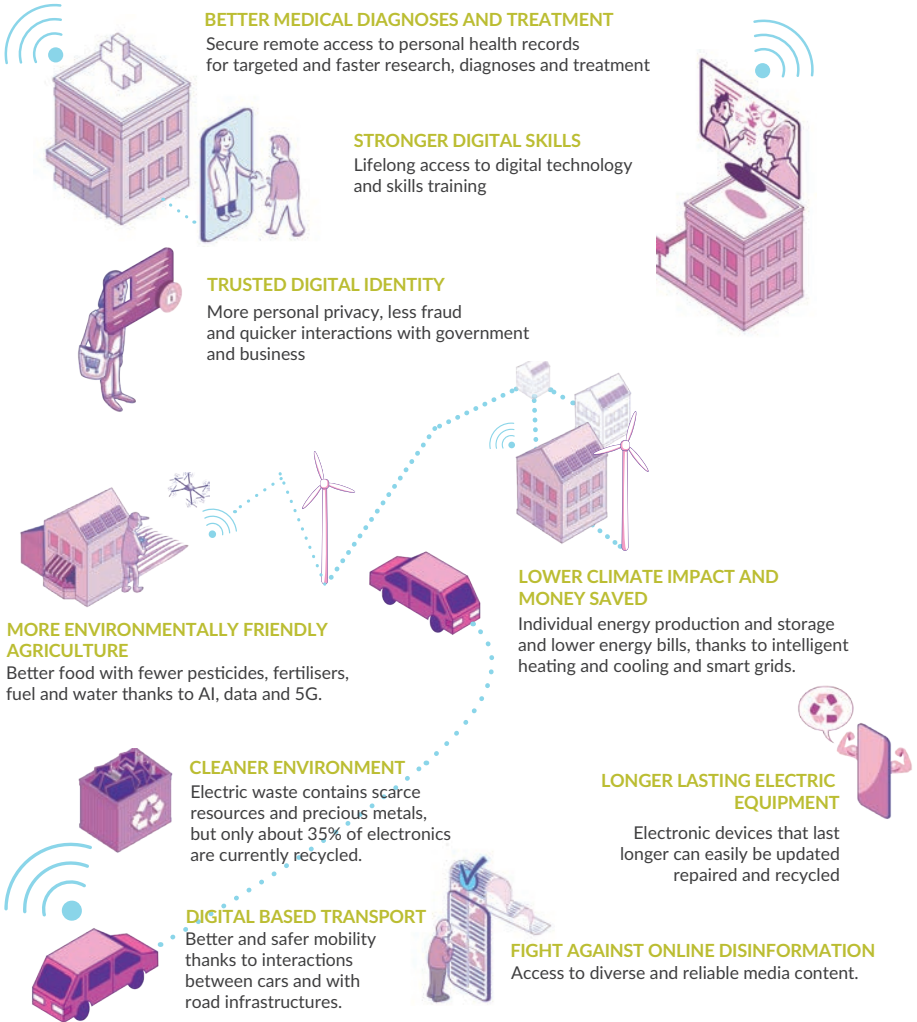
Data-driven strategic planning and operation, and the wider use of data in financial intermediation, are also becoming increasingly common. As a result, and in the light of the digital evolution of financial markets over the years, and in order to accelerate it and exploit the potential competitive advantages, network monopolies are also expanding in the financial sector. Although confidence in traditional financial players is still high, the situation could change rapidly and network monopolies could become systemically important players in the financial sector, even ones that are too big to fail. With this in mind, it is of the utmost importance that regulation addresses potential problems in a timely manner, especially given that the current financial regulatory framework is not designed for the business model of network monopolies.

As a solution, an entirely new, complex regulatory regime seems feasible with a dual orientation: instead of a purely institution-based approach, an institution-based approach of the Member State in which the registered office is located may be able to cover the cross-border, group-level activities of network monopolies, while on the side of the supervisory authorities of the receiving countries, an activity-based regulation may be able to address the risks they face. However, even this hybrid model can only be effective if the regulation addresses the specific risks that arise in a dedicated manner and is able to keep pace with the continuous evolution of business models.

Figure 21.3: Benefits of digitalisation in everyday life

Source: European Commission (February 2020);
All images © European Union

ALL EUROPEANS CAN THRIVE IN A DIGITALISED SOCIETY



THE DIGITAL MARKETS ACT:
ENSURING FAIR AND OPEN DIGITAL MARKETS
SOURCE | EUROPEAN COMMISSION (EUROPA.EU)

Moreover, as we have stressed in the context of the regulation aiming to protect competition, the development of holistic regulatory and supervisory cooperations across sectors and borders is also a key point in the elaboration of a dedicated financial regulatory framework for network monopolies.

THERE HAVE ALREADY BEEN SUCCESSES IN REGULATING NETWORK MONOPOLIES

An analogy to understand the data-driven business model of BigTech firms can be found in the similarly concentrated networked market of credit card providers.

The special aspect here is that the product only becomes attractive to credit card users if it is accepted in many places, so merchants are only willing to ensure widespread acceptance if they can count on a large number of users. To kick-start the card markets, an incentive mechanism was therefore needed to help the system development. This was ensured by the interchange fee allocation mechanism.

The specificities of bilateral markets mean that, in addition to pricing, the price structure is also an important issue, as it can favour one side or the other. When starting up a system, it is usually advisable to support the side with the higher price elasticity, i.e. the cardholders. The support is provided through the interchange fees which are paid by merchants to card issuers, who could transfer a part of the fees to the cardholders. However, an excessive level of interchange fees in a developed market can cause a number of problems; it can hamper market development and have a negative impact on competition. The problem was addressed by regulation. Currently, payment service providers are not allowed to charge interchange fees of more than 0.2–0.3% of the value of the transaction for debit and credit card transactions.

The first empirical studies (Kajdi – Kiss, 2021) show that the regulation has improved competition in the domestic market in the short term and reduced costs for merchants. However, it remains to be seen whether the current regulation is sufficient in the long run, as it is still true that card acceptance cannot be considered universal due to the cost levels for merchants. In addition to price regulation, this situation can be helped by other competition-enhancing processes, such as the spread of instant payment services, which can be used as a cheaper alternative to merchant card acceptance.

However, as the bilateral and networked nature of the payments market is the same for instant payment services, it is a key responsibility of regulators to prevent, in this emerging market segment, the emergence of oligopolistic service structures like in the card market. This can be achieved primarily by ensuring the interoperability of different market

**ONLY FUTURE-PROOF,
TECHNOLOGY-NEUTRAL,
INNOVATIVE REGULATION
CAN BE EFFECTIVE AGAINST
NETWORK MONOPOLIES.**

services based on instant payments, which mostly requires the adoption of common or open message and data input technology standards.

A COMPLETE RETHINK OF REGULATORY APPROACHES IS ESSENTIAL

The emergence of network monopolies requires a completely new regulatory approach, as the current regulatory framework is not able to effectively protect competition and consumers. Only future-proof, technology-neutral, innovative regulation can be effective in the face of network monopolies that are developing at a rapid pace. While the need for regulation is growing, only well thought-out, carefully considered regulation can achieve the desired goals.

REFERENCES

- Berlin Centre Consumer Policies, Regulatory Challenges in Digital Markets (2021): The Digital Markets Act, Online Panel, 18 June.
- Carstens, A. – Claessens, S. – Restoy, F. – Shin, H. S. (2021): Regulating bigtechs in finance (BIS Bulletin No 45), 2 August.
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions A European Strategy for Data, COM(2020) 66 final, Brussels, 19 February 2020
- Crisanto, J. C. – Ehrentraud, J. – Fabian, M. (2021): Big techs in finance: regulatory approaches and policy options (BIS Bulletin No 12), March.
- Kajdi, L. – Kiss, M. (2021): The impact of policy effects on the Hungarian payments card market. *Journal of Banking Regulation*.
- Molenaar, C. (2021): A verseny vége: A hálózati gazdaság hatása (The End of Competition: The Impact of the Network Economy), PABOOKS.
- Proposal for a Regulation of the European Parliament and of the Council on European data governance, COM(2020) 767 final, Brussels, 25 November 2020.
- Proposal for a Regulation of the European Parliament and of the Council on contestable and fair markets in the digital sector (Digital Markets Act), COM (2020) 842 final, Brussels, 15 December 2020.



V

**Underlying structures
of the economy**

EMESE KREISZNÉ-HUDÁK,
KRISZTINA ZANATY,
PÉTER HUGÓ ASZTALOS

THE ECONOMIC IMPACT OF DEMOGRAPHIC DEVELOPMENTS

*“For advanced societies,
the most important economic and social
challenge of the 21st century will be
addressing the issues arising from
the ageing of the population.”*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



New, sustainable economics needs to include **demography, which may have an unprecedented economic and social impact in the decades ahead**. The two most important megatrends characterising global population developments are **population growth** and the **ageing of society**. Demographic developments can have major economic consequences: they transform the labour market, influence labour productivity, change consumption and saving habits, realign the structure of production and also affect long-term growth prospects.

Economically less developed countries with growing populations face different challenges than their developed peers where ageing is more pronounced. Europe may be the only continent where the size of the working-age population shrinks in the decades to come. Tackling this requires measures that can appropriately guide demographic developments to increase or even maintain the labour supply.

Demographic developments will also exert a huge impact on countries' social safety nets. Pension systems in developed countries need to overcome two main challenges: financial sustainability on the one hand, and the provision of adequate pensions on the other hand. The rise in life expectancy and the number of elderly is expected to entail an increase in demand for healthcare services in the decades ahead.

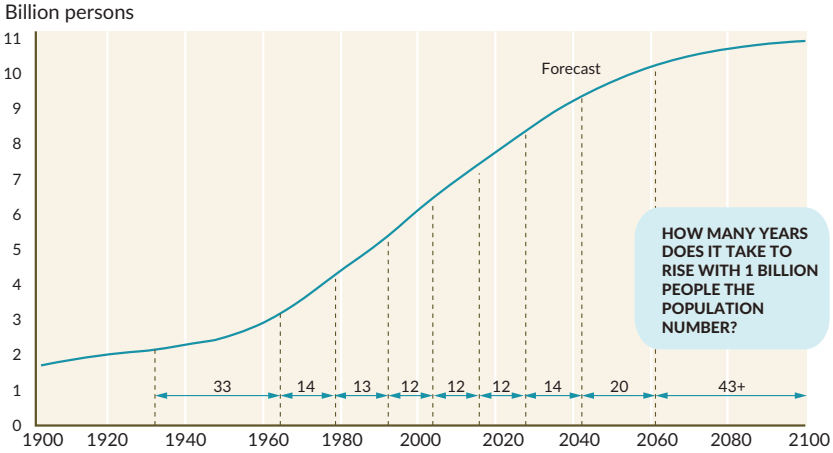
GLOBALLY GROWING POPULATION, LOCALLY AGEING SOCIETY

Global demographic trends are characterised by a slowdown in population growth and the ageing of the population. In 2021, the global population was 7.9 billion, and this figure may rise further in the decades to come, probably **peaking at 10.9 billion** in 2100 (*Figure 22.1*).

Figure 22.1: World population, 1900–2100

Source: UN World Population Prospects 2019, medium version; History Database of the Global Environment

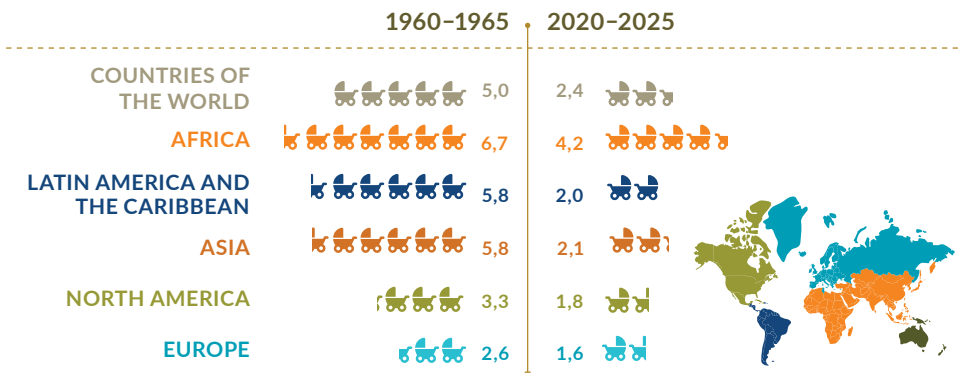
Note: Pre-1950 data are extrapolated; from 1900 to 1950 global population data are available at 10-year intervals. Chart shows actual data between 1950 and 2015, now-casting between 2015 and 2020, and forecasting from 2020, based on the UN database.



POPULATION DISTRIBUTION

Figure 22.2: Total fertility rate in the countries of the world and on the continents

Source: UN World Population Prospects 2019, medium version
Note: Data are available in the UN database for periods of five years.



However, the overall rise in global population masks varying local demographic developments. In economically less developed, low-income countries, the number of children per female is currently around 4.5 (UN, 2019). By contrast, in economically advanced regions, the total fertility rate is typically below the value of 2.1, the level necessary for reproduction of the population (Figure 22.2). Of the world's continents, **Europe is the only one where the population is expected to decline in the next decades.**

The other megatrend characterising global population is the ageing of the population, which is one of the most important economic and social challenges of the 21st century. The rise in the share of the elderly population within the total population is attributable to the decrease in the total fertility rate as compared to earlier years, as well as rising life expectancy. **The number of those aged over 65 may more than double in the next three decades**, from 728 million in 2020 to over 1.5 billion in 2050 across the countries of the world. The ageing of the population may entail a rise in the ratio of the old and younger generations and thus, *ceteris paribus*, a growing burden on the economically active population.

The old-age dependency ratio may jump from 14 percent to 25 percent globally between 2020 and 2050 (Figure 22.3). In the decades ahead, **Europe could be the continent with the oldest population:** the proportion of people aged over 65 may rise from 19 percent in 2020 to 28 percent in 2050. Of the continents, Asia may be home to the largest old-age population in 2050, with numbers rising from the current 412 million to 955 million until 2050 (UN, 2019).

DEMOGRAPHIC DEVELOPMENTS SHAPING THE LABOUR MARKET

Across the world, the working-age population will increase in the coming decades, but the growth rate of the economically active population may drop considerably relative to the past 20 years. The size of the working-age population amounted to 5 billion in 2020, representing 65 percent of the total population of 7.8 billion. The number of 15–64-year-olds increased by 31 percent between 2000 and 2020, while the UN's population forecast projects only 15-percent growth in the next two decades.

Figure 22.3: Old-age dependency ratio in the regions of the world, in 2020 and in 2050 (percent)

Source: UN World Population Prospects 2019, medium version

Note: Old-age dependency ratio shows number of elderly people per 100 working-age people.

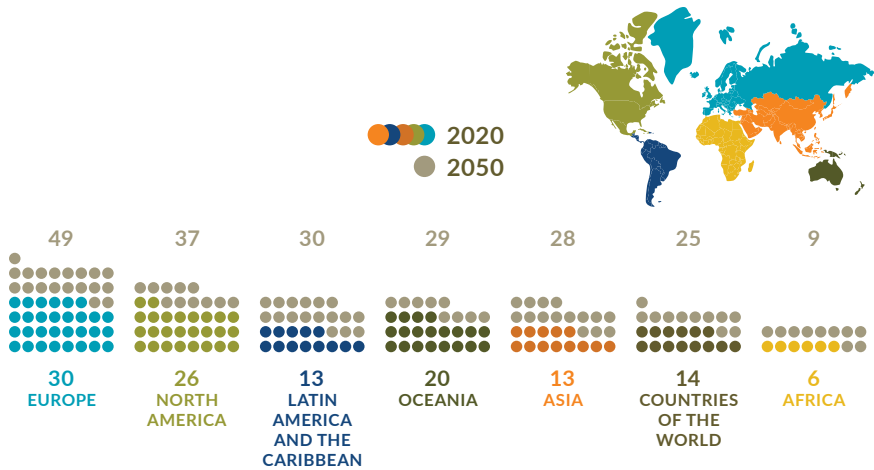
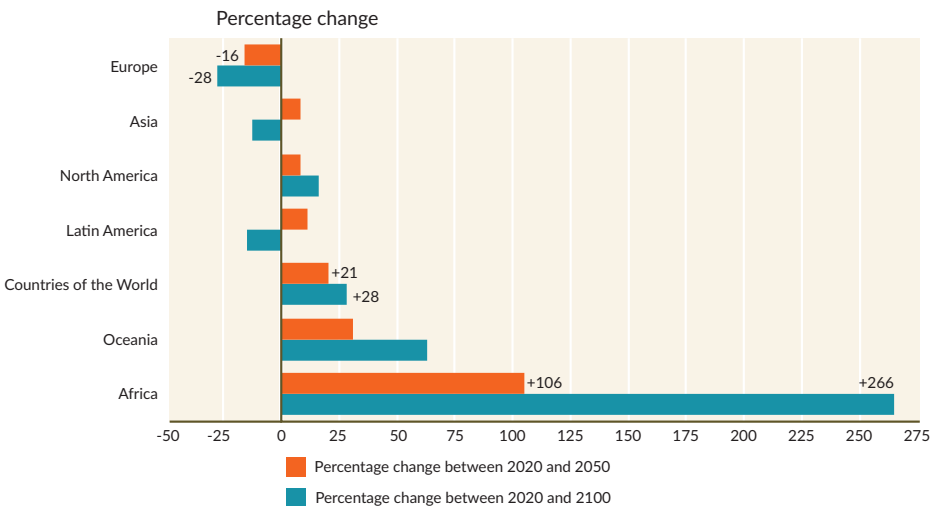


Figure 22.4: Estimated change in size of working-age population between 2020 and 2050 and between 2020 and 2100, for certain continents (percent)

Source: UN World Population Prospects 2019, medium version



Except for Europe, the size of the working-age population is expected to rise in all regions until 2050, but in the second half of the century the number of 15–64-year-olds may start to decline in Asia and Latin America as well (Figure 22.4). **In Africa, the size of the working-age population may double from 753 million in 2020 to over 1.5 billion in 2050**, while the current figure could almost triple by the end of the century. By contrast, in Europe the size of the working-age population may shrink by almost 30 percent by the end of the century.

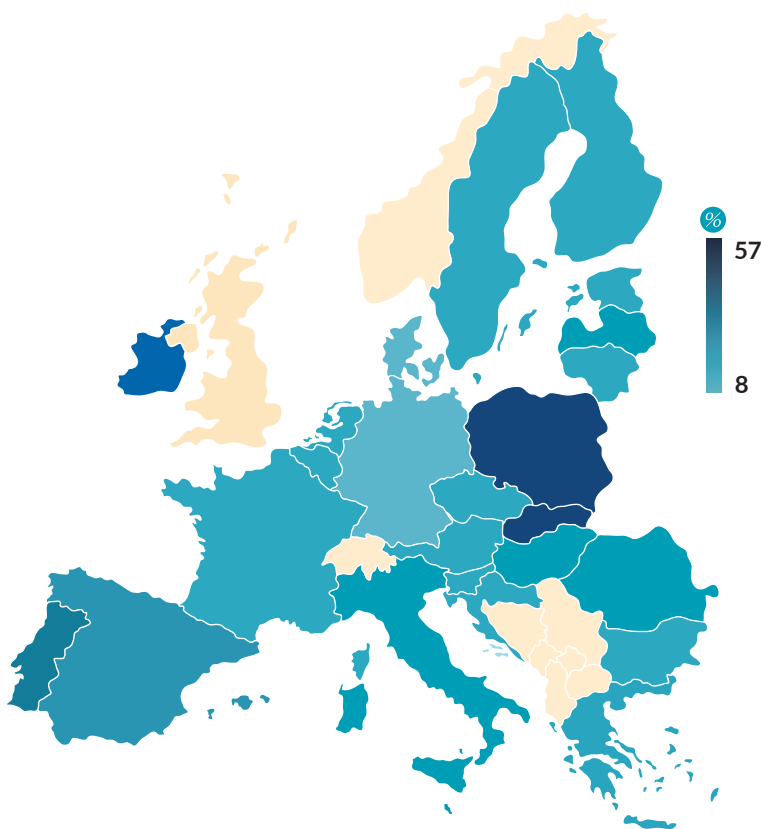
In advanced countries with shrinking working-age populations, addressing labour shortages may require appropriate economic policy measures. In the long run, the changing structure of the population will also impact countries' growth prospects. The ageing of the population may reduce aggregate productivity (Figure 22.5) and may also affect **consumption** and **saving rates**.

The negative labour market effects of shrinking working-age populations can be offset by several measures in the short run. Such steps include **increasing the participation rate** of highly vulnerable groups on the labour market (young workers at the start of their careers, those before retirement and the low-skilled), **extending active career paths** and prioritising **capital-intensive growth**, in particular the rise in **automation**. In the long run, tackling labour shortages requires measures that can appropriately guide demographic developments to increase or even maintain the labour supply. One key objective is to **increase the total fertility rate**, but the positive economic effects of this can only be felt with a lag of several decades.

In the long run, ageing societies may experience a shift in consumer needs, and in certain sectors production and employment will need to adjust to this. As people grow older, their demand for **healthcare services** and energy consumption increases, while their spending on other products and services (such as cars, fuel and education) typically declines.

Figure 22.5: Expected increase in public spending on healthcare as a percentage of GDP in EU Member States between 2019 and 2070 (estimate)

Source: European Commission (2021)



BUDGETS ALSO NEED TO ADJUST TO CHANGING DEMOGRAPHIC CONDITIONS

Developing and developed countries may face different challenges in **financing old-age pensions** due to the ageing of the population. In developing countries, pension systems currently have low coverage, and therefore the share of those receiving an old-age pension should be increased to ensure an appropriate standard of elderly lifestyle (UN, 2018). Developed countries have broad pension system coverage, but face significant challenges in terms of financial sustainability. Demographic changes may have a negative effect on budget revenues and expenditure, making it more difficult to ensure financial sustainability. On the revenue side, the decline in the size of the working-age population may result in lower tax and contribution revenues related to wages. On the expenditure side, as the number of elderly people grow, pension expenditure may rise, along with public spending on healthcare and spending on long-term care. According to the results of the European Commission's report from 2021 (EC, 2021), **pension spending relative to GDP in European Union countries may increase from 11.6 percent in 2019 to 12.6 percent in 2050.**

The rise in life expectancy and the number of elderly is expected to entail **an increase in demand for healthcare services** in the decades ahead. Life expectancy at the age of 65 may grow by another 2–3 years in all regions (UN, 2019). The extent of the rise in demand for healthcare services also depends on whether the continued increase in life expectancy is accompanied by a rise in the number of **healthy life years**. The European Union's latest projection **estimates public sector spending on healthcare to rise by 18 percent on average by 2070** (EC, 2021). However, the surge in spending will not affect all countries evenly (*Figure 22.6*).



THE 2021 AGEING REPORT



***IN THE LONG RUN,
A DEMOGRAPHIC TURNAROUND IS
NEEDED TO ADDRESS THE LABOUR
MARKET CHALLENGES POSED
BY THE AGEING
OF THE POPULATION.***

The key to the sustainability of healthcare systems is **prevention** and strengthening this could ease pressure on the healthcare system. Maintaining a healthy diet, engaging in frequent physical activity and reducing tobacco and alcohol consumption can prevent several diseases and reduce the mortality rate related to such behavioural risks, which is estimated to account for almost 40 percent of total deaths in the European Union (EC, 2019). The increase in the share of the elderly population also holds potential, which can be consciously exploited (for example by enhancing health tourism) to promote economic growth. Overall, **the significance of healthcare and the health industry within the economy is expected to increase** on account of demographic trends and technological progress.

REFERENCES

- European Commission (2019): Country Health Profiles.
- European Commission (2021): The Ageing Report (2016-2070). Institutional Paper No. 148.
- United Nations (2018): Promoting Inclusion Through Social Protection – Report on the World Social Situation 2018.
- United Nations (2019): World Population Prospects 2019.
- History Database of the Global Environment (2021)
- MNB (2019): “A jövő fenntartható közgazdaságtana” (Sustainable economics of the future). Book series of the Magyar Nemzeti Bank, Budapest.

GYÖRGY KOCZISZKY

VALUES AND CULTURE
BEHIND SUSTAINABLE
ECONOMIC GROWTH

*The foundation of value-based
economics is that there is “good”
and “bad” growth outside
the world of abstract models.*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



Mainstream economics associates the foundation of nations' welfare with the amount of economic output and the growth rate. In recent decades, the stipulation of economic growth as the sole macroeconomic objective, without any reservations, has been increasingly criticised from several aspects. Therefore, one can rightly ask: **is there good and bad growth? What role do values and culture play in sustainable and unsustainable growth?** Which values promote sustainable economic growth in the 21st century? These questions are answered by analysing the theory and empirical observations of economics, as well as the correlations with economic and cultural history, ethics and economic policy.

1. GOOD AND BAD GROWTH

At its core, sustainability – in other words, responsibility for the future – is a question of values, which pits public interest against the approach based on the market's autonomy and omnipotence. This is because economics is not only a positive science, but also a normative one, and as such it must be able to tell us how the “world” should work. Social, environmental, economic and institutional issues should be revisited along these lines.

The model outlined here mainly differs from the three-pillar structure in the literature (economic, ecological, social) in that it **focuses on values** and incorporates a sustainable institutional system as the fourth pillar (*Figure 23.1*).

The focus on values is warranted by the fact that a community's opinion about society, the economy, the institutional system and the living and non-living environment is strongly influenced by historical, religious and cultural factors. Values determine the criteria according to which a community decides on the sustainability or unsustainability of society and the economy as well as the environment.

A powerful cohesive force of societies is based on the values that have become generally accepted conventions, and which have changing elements as well as constant ones spanning generations. The sustainability of values depends on the share of lasting elements that have endured for centuries and those of the various “isms” generated by global interest groups.

Figure 23.1: A model of a sustainable market economy

Source: Author's compilation

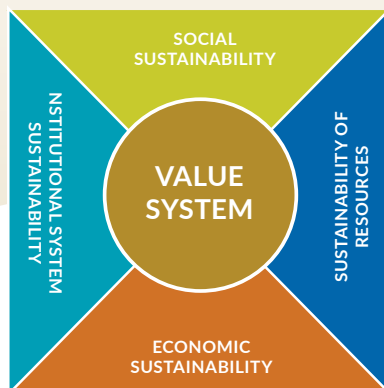
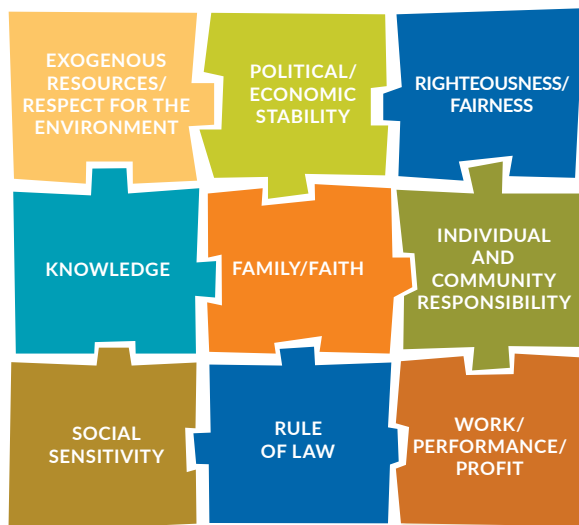


Figure 23.2: Values in a sustainable market economy

Source: Author's compilation



MNB BOOK SERIES:
ETIKUS KÖZGAZDASÁGTAN
(ETHICAL ECONOMICS)

After WW II, as liberalism became increasingly popular, slowly but surely values became important that focus on overemphasising self-fulfilment, self-expression and postmodernism. Many of the negative consequences of this can be observed in day-to-day life. This set of values has been criticised by many based on various aspects. “... The idea of culture has broadened to such an extent that, although nobody would dare to state this explicitly, it has disappeared” (Vargas Llosa, 2014). Therefore, both individuals and communities need, perhaps more than ever, spiritual and moral support instead of nihilism, and a firm foothold amidst the uncertainty. Such fixed points include spirituality and family, which are closely related to justice and social awareness, as well as knowledge, responsibility, subsidiarity, solidarity, respect for the environment and fairness (*Figure 23.2*).

Spirituality impacts people’s behaviour and their concept of wealth. The historically important churches rooted in Hungary have regularly commented on social issues since the late 19th century and criticised the market’s self-regulation and state intervention. In her long-overdue contribution to Hungarian literature, Katalin Botos rightly argues that **“World religions play an important role in the success of individual countries and country groups”** (Botos, 2009).

Modern economics has focused on self-interest from its inception, based on the yet-to-be-confirmed assumption that the “invisible hand” would ensure the welfare of society. Deviation from cultural traditions and promotion of the importance of self-fulfilment often leads to breaches of basic ethical principles and a lack of self-restraint (a sort of hedonism), the consequences of which can be seen every day. The education of economics continues to be based on the concept of Homo oeconomicus, which focuses on maximising gains. It broadly disregards the impact of human values while examining the correlations between prices and amounts and supply and demand. However, such mainstream economics has clearly reached its limits, and it has been unable to provide answers within its own framework. The population decline in advanced countries, the recurrent financial crises and the pollution that threatens the whole planet all show that economics need to be placed on new foundations.

Table 23.1: Values in schools of economic thinking
 Source: Author's compilation

SCHOOL, FUNCTION	CLASSICAL ECONOMICS	NEOCLASSICAL – NEW NEOCLASSICAL ECONOMICS	KEYNESIAN ECONOMICS	MONETARISM	ETHICAL ECONOMICS
DISTRIBUTION	Price Market, economic agents are well-informed	Based on market rules and efficiency, as well as utility	Amount of produced goods is regulated by the price mechanism	Market efficiency, competition	Equity Justice, environmental awareness, universal use of goods
REDISTRIBUTION	Opposed, as it hinders market developments and checks the accumulation of wealth	Efficiency and normativity	State must generate demand	Market efficiency dominates	Social awareness Spatial fairness Environmental awareness Solidarity and subsidiarity
INSTITUTIONAL COORDINATION	Weak state	Partial significance	State-generated demand	State does not act with due care Minimal state engagement, the amount of money can be regulated with the central bank base rate	Strong state Ethical state Lawful state
MARKET COORDINATION	Not needed (<i>laissez-faire</i>), it disrupts the perfect balance	Market creates balance Competition Generation of supply	Generation of demand	Necessary evil	State intervention is needed

The growth theory based on values and culture seeks to redress the weaknesses in mainstream economics by integrating **values** into economic thinking, along with the sustainable **cultural heritage** of a given community as well as **ecological** principles, and by consolidating the cognitive approach with the results of closely related disciplines (e.g. ethics, philosophy). This approach does not focus on profits alone, but on equitable, fair and sustainable economic output aligned with real needs, in contrast to neoclassical economic schools of thought mirroring political liberalism that concentrate on rational individuals and the free market. A central element in ethical economic thinking is the **community taking responsibility for others, which, however, does not preclude being economical, efficient and competitive.**

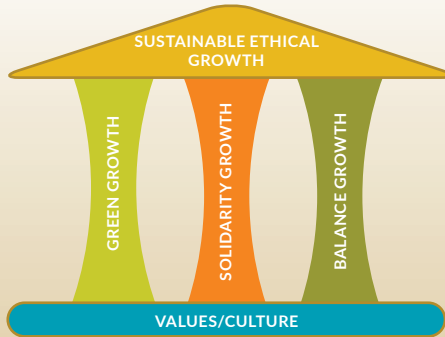
The foundation for value-based economics is that there is “good” and “bad” growth outside the world of abstract models. In other words output can expand while being aligned with society’s needs (and with what the environment has to offer), and it can also run counter to this. Furthermore, certain activities fulfil real needs, while others create unjustified needs generated by producers and service providers. Overheated demand encourages obtaining unnecessary goods, which once again generates unnecessary demand (cf. growing alcohol consumption and the treatment of alcohol-related problems, or the overconsumption of sweets and the need to treat an increasing number of diabetes patients (Trebeck – Williams, 2019)).

Ethical economics is not value-neutral. Its values and world view focus on more than just material prosperity, wealth, savings and material welfare. Over the course of history, societies’ values and their opinion about the economy and economic agents clearly change from time to time, but a sustainable society has lasting values that stretch across ages and “isms”, such as **family, solidarity, subsidiarity, responsibility, human dignity and respect for human life.**

In terms of integrity, ethical principles (justice and equity, fairness, sustainability, solidarity and social responsibility) and economic principles are equivalent and equally firm. Ethical growth is based on values that ensure **green, socially sensitive and balanced growth** at the same time. These three factors are not mutually exclusive, they are related and complement each other. In this case, **the weakest link determines the vulnerable spot or bottleneck of growth.**

Figure 23.3:
Pillars of economic growth based on values and culture

Source: Author's compilation



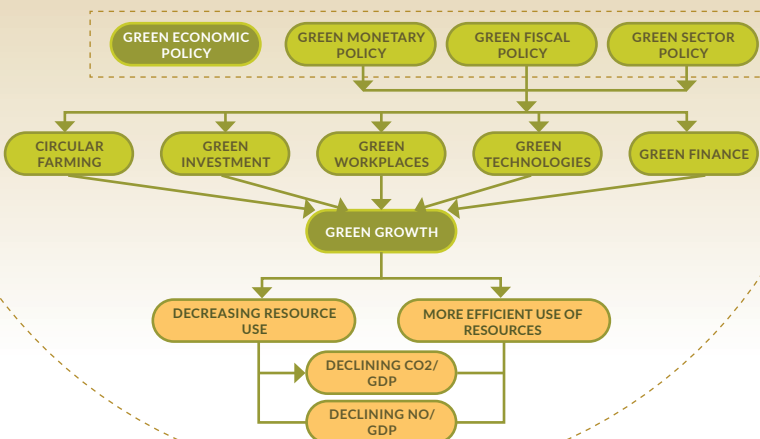
“Since we see that every city-state is a sort of community and that every community is established for the sake of some good (for everyone does everything for the sake of what they believe to be good), it is clear that every community aims at some good, and the community which has the most authority of all and includes all the others aims highest, that is, at the good with the most authority.” (Aristotle: Politics. Book I, p. 1.)

“For what will it profit a man if he gains the whole world and forfeits his soul?” (Matthew 16:26)

„Take care, and be on your guard against all covetousness, for one's life does not consist in the abundance of his possessions.” (Luke 12, 15 b)

Figure 23.4: Chain of effects of green growth

Source: Author's compilation



GREEN GROWTH: WE ONLY HAVE ONE EARTH

Ethical economic growth is green (carbon-neutral) growth, where output growth occurs while resources are utilised less and more efficiently. Optimally, economic growth is on a different trajectory from energy consumption and emissions. In other words, the growth rate of economic output is greater than the ecological footprint and the use of non-renewable natural resources. In the case of absolute separation (green growth), output increases, while the ecological impact remains unchanged.

SOLIDARITY: WE ARE ALL IN THE SAME BOAT

In contrast to economic prosperity ensured “purely” through market instruments, growth based on values and culture **seeks to mitigate income and wealth inequalities, and create social solidarity**. It supports groups that have become disadvantaged through no fault of their own, and provides a value- and culture-based background that encourages the disadvantaged groups of those left behind to improve their own situation.

In practice, a purely market-based system results in constant distortions and does not ensure equitable access to basic public goods. These fatal flaws in distribution can only be corrected if certain basic public goods and services are provided at the expense of economic output. Empirical studies have shown that **in countries that experience a dramatic increase in income and wealth inequalities, economic growth and recovery after a recession are slower in the longer run** (Ostry et al., 2014).

Economic output based on values and culture is not overstretched. It offers an opportunity for limited state intervention (external growth), and it inherently builds on self-control and local resources ensuring internal growth.

At whose expense economic growth appears and becomes sustainable is a question of values. **Without balance, sustained growth is not possible**. Therefore, it is wrong to claim that balance and growth are mutually exclusive (Matolcsy, 2015).

Figure 23.5: Impact of the hiatus in solidarity and social responsibility on economic output

Source: Author's compilation

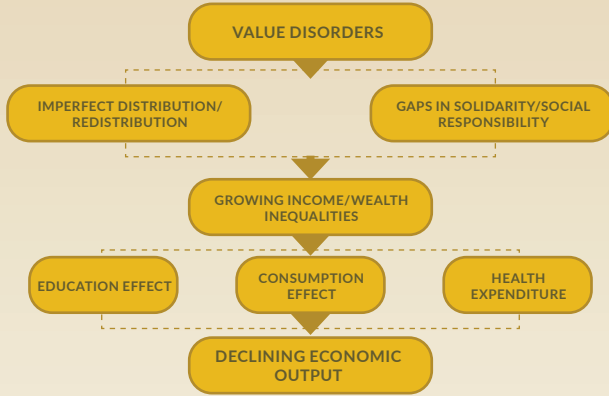
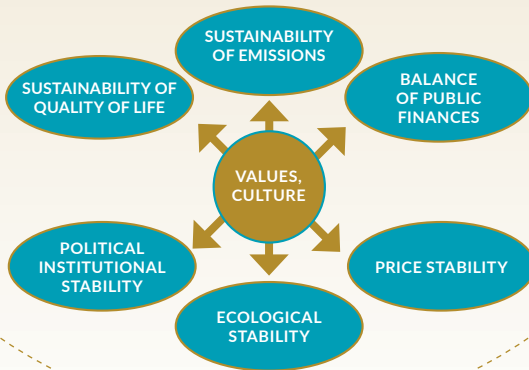


Figure 23.6: Conditions of balanced growth

Source: Author's compilation



THE MNB'S
CORPORATE SOCIAL
RESPONSIBILITY STRATEGY

REFERENCES

- Botos, K. (2009): Keresztény Gazdaság – Globális Piacgazdaság (Christian Economy – Global Market Economy). Kairosz Kiadó, Budapest.
- Erdős, T. (2003): Fenntartható Gazdasági Növekedés (Sustainable Economic Growth). Akadémiai Kiadó, Budapest, 2007.
- Matolcsy, Gy. (2015): Egyensúly és növekedés (Economic Balance and Growth). Konszolidáció és stabilizáció Magyarországon, 2010-2014 (Consolidation and Stabilisation in Hungary, 2010–2014). Magyar Nemzeti Bank, Budapest.
- Ostry, J.D. – Berg, A. – Tsangarides, G. (2014): Redistribution, Inequality, and Growth. IMF Staff Discussion Note 14/02. IMF, Washington.
- Trebeck, K. – Williams, J. (2019): A megérkezés gazdaságtana. Gondolatok egy felnőtt gazdaságról (The Economics of Arrival: Ideas for a Grown-Up Economy) Pallas Athéné Könyvkiadó, Budapest.
- Vargas Llosa, M. (2014): A látványcivilizáció (Civilization of the Spectacle). Európa Könyvkiadó.

NORBERT CSIZMADIA*

GEOFUSION, SPATIAL STRUCTURE AND GEOPOLITICS

*“Geography is back, and it has
become even more important
in the age of fusions.”*

ADDITIONAL
BACKGROUND MATERIAL
FOR THIS CHAPTER IS
AVAILABLE ONLINE



** Norbert Csizmadia, chair of the Board of Trustees of the Pallas Athene Domus Meriti Foundation (PADME)
Email: csizmadia.norbert@padmebudapest.hu

The 21st century breaks with traditional geographical maps, and therefore we must redraw them. We need a new approach, and increasingly unique solutions are becoming warranted. This requires a new, associative perspective, comprehensive knowledge, unique ideas and creativity. In order to create new knowledge, we must familiarise ourselves with the world around us, the nodes in the networks and the integrated knowledge, with the help of associative maps that help in focusing on what is important and mobilising creativity.

TECHNOLOGICAL PROGRESS UNDERLINES THE IMPORTANCE OF SPATIAL ASPECTS

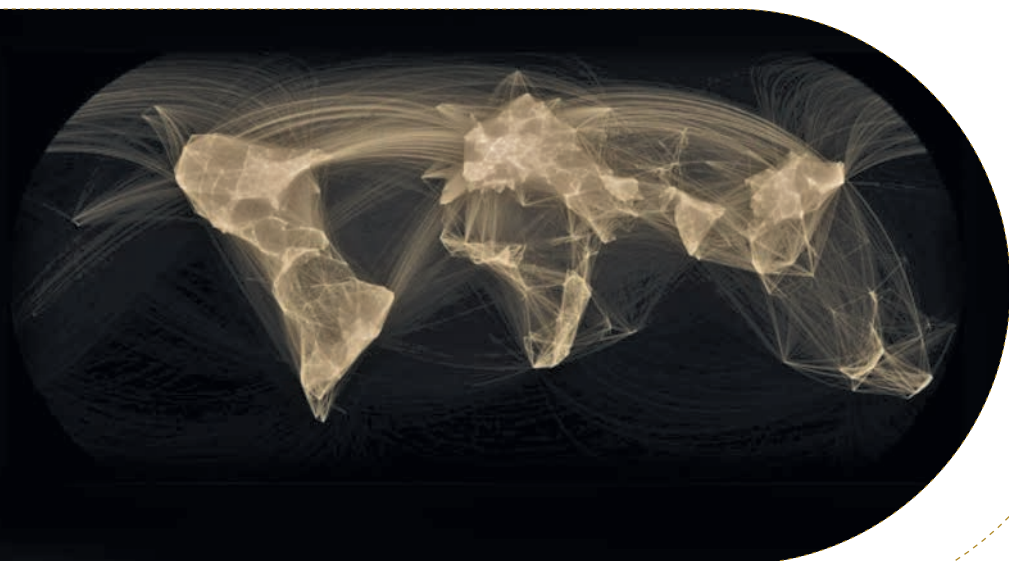
Robert D. Kaplan (2018) believes that **geography holds the key to understanding the drivers** of the world, in particular **geopolitical and foreign policy conflicts**. He shows why it is unwise to disregard the impact of geographical factors on human societies and history as obsolete, and to underestimate and not use it to understand and resolve conflicts. Technological progress has not led to the “death of geography”; on the contrary, it has even underscored the importance of spatial aspects. **To understand the geopolitical developments of the early 21st century, several disciplines need to be coordinated**, including history, economics, physics, biology, geography, sociology, cultural anthropology and engineering (technology and materials science). This is a sort of fusion, i.e. the assertions that provide the basis for the hypotheses are developed by harmonising and combining various disciplines.

Thanks to the global 24/7 economy based on new technologies, talent finds a way while bridging distances. However, the (economic and other) mobility of not only the individual has increased with the advent of the internet, modern transportation and new industries, but also that of nations, communities and countries. At the same time, humanity is confronted with unparalleled challenges, such as climate change, environmental degradation that threatens the fundamental conditions for human life and adaptation to the related consequences, rising economic and social inequalities, economic crises, international conflicts and migration (Csizmadia, 2016).

This paints a picture of the new world order where the possession of power will be just as important as profits. This will be coupled with the increasing economic engagement of the state; conflicts will undermine economic integration; multilateral systems will regress to the regional level instead of becoming global; and therefore, countries will compete for markets rather than resources.

Figure 24.1: Air traffic and knowledge network maps

Source: Geofusion 2.0, Scimap



The lines between trade and strategic objectives are increasingly blurred in the case of sectors such as technology and finance. In the age of geoeconomics, countries do not wish to promote the free market. On the contrary, they use market tools to increase their own strength, i.e. the economy is an instrument for great-power politics.

WE LIVE IN THE AGE OF NETWORKS AND FUSIONS

After the age of globalisation, the age of technology has arrived. This is the geography of knowledge and fusions, or “geofusion”, the fusion of places, in the age of networks. Modern life is impossible without networks. One of the most interesting and most important features of networks is that **every single network includes special hubs with many connections.** These hubs have a spatial dimension as well, and they can be seen on our maps. For example in the network of air traffic or in knowledge networks, where central hubs and patterns can be detected based on collaborations between universities.

Along with geographical places, spatial flows are also increasingly important. Manuel Castells argues that instead of the historically developed geographical approach (“space of place”), actual developments call for a “space of flows” approach. Nevertheless, the global change in the international economy is uneven, and geographical differentiation is much greater than ever. A complex spatial structure is emerging, and therefore the global economy is much more of a multipolar system now.

As Parag Khanna (2016) put it, **competitive connectivity is the key geopolitical driver of our age.** In terms of the morphology of space, connectivity has become a new world paradigm, and our maps can now be complemented with power lines, highways, railway networks, internet cables, air routes: in other words, the symbols of the global network society. Khanna believes that geopolitical competition is supplemented and its nature is transformed in the fight for connecting supply systems.

Figure 24.2: “Geofusion” map of the 21st century, based on connectivity and geographical networks

Source: Geofusion 2.0, (2021)



***TO UNDERSTAND THE GEOPOLITICAL
DEVELOPMENTS AT THE BEGINNING
OF THE 21ST CENTURY,
SEVERAL DISCIPLINES NEED TO BE
COORDINATED.***



BOOK LAUNCH OF
“GEOFUSION”

The fusion of places or “**geofusion**” is a geographical synthesis producing new results in geography with the simultaneous application of economic policy, technology, design and visualisation. Geofusion maps offer new perspectives on a wide range of areas, explaining **geopolitical and geoeconomic** correlations. Geofusion mapping methods employ connectivity factors, infrastructure and knowledge networks, key global hubs and a new way of interpretation based on the geopolitical structure in geographical hubs.

A NEW WORLD ORDER IS DAWNING A LONG-TERM SUSTAINABLE EURASIAN VISION

The previous unipolar world order is becoming multipolar, while global strategies are being replaced by regional cooperation. In these new times, geography and economic geography are on the rise, geopolitical developments are replaced by geoeconomic ones, where the competition will be for markets rather than territory. **The centre of gravity of the world economy is shifting towards the East again,** marking the end of a 500-year Atlantic period. While the 19th century was the age of the British Empire and **the 20th was that of the USA,** **the 21st century will be the century of Eurasia.**

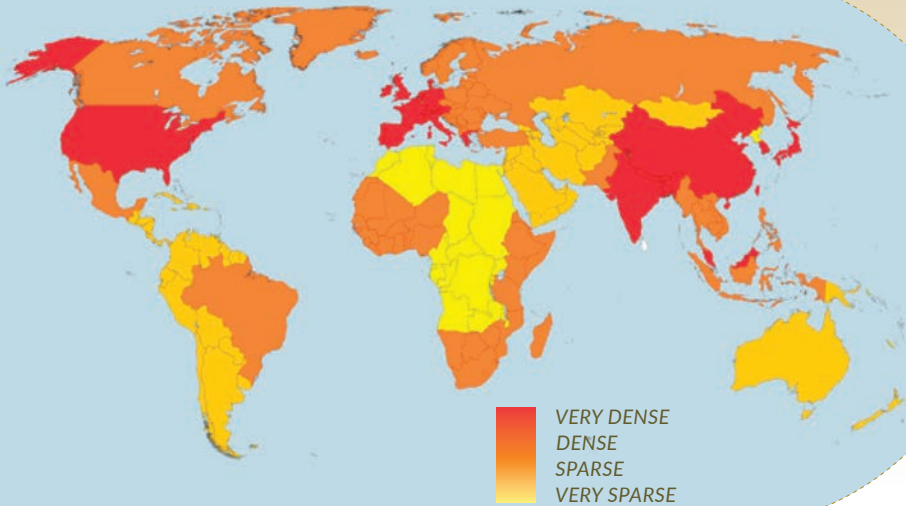
The rise of geography and new geofusion maps can be used to determine geopolitical structures and designate the main power centres of the multipolar world economy based on geographical factors. Geopolitical and civilisation theories and connectography as well as geofusion maps help outline the most important power centres, areas, and connections in the multipolar world order of the 21st century.

Four regions stand out in terms of connectivity: North America, Europe (Western Europe), China and Southeast Asia as well as the Indian subcontinent.

If the density of geopolitical regions is analysed together with countries at the level of nation states as well as with global cities and hubs, using the geofusion method based on connectivity factors (i.e. global urban hubs and the significance of nation states as well as the economic force fields that emerged based on connectivity factors), this can be used to determine the geopolitical and geoeconomic force fields of this period as well as the most important geopolitical players and actors, just like the various types of geopolitical regions.

Figure 24.3: Connectivity factors and geofusion

Source: Author's compilation (2019)



***THE PREVIOUS UNIPOLAR
WORLD ORDER IS BECOMING
MULTIPOLAR, WHILE GLOBAL
STRATEGIES ARE BEING REPLACED
BY REGIONAL COOPERATION.***

It should be noted that in today's world, hierarchical spatial systems (global cities, nation states, geopolitical regions) need to be examined together to determine the force fields; the geofusion approach (i.e. the simultaneous analysis of connectivity factors, the nation state level and hubs) helps precisely in this.

According to the maps prepared on the basis of the analysis and the earlier geopolitical structure, within the 36 regional territorial units:

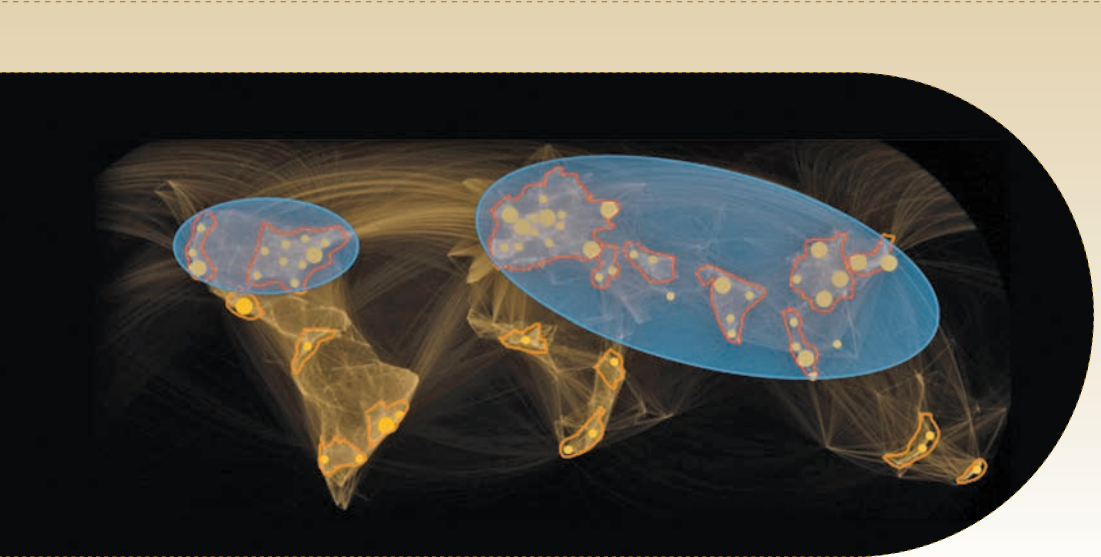
- ▶ **There are two (large) global geopolitical force fields**, namely America and Eurasia, with two main great powers acting as geopolitical leaders: these are China and the USA (which are also referred to as the G2 countries).
- ▶ The analysis identified **16 regional powers**: Russia, India, Japan, South Korea, Australia, Iran, Saudi Arabia, Turkey, Israel, Germany, France, UK, Italy, Scandinavia, Brazil and the Republic of South Africa.
- ▶ Among geopolitical regions (as regional force fields), gateway regions will be especially crucial in the future, largely owing to transportation and trade. **Six major gateway regions** were identified by the analysis: Southeast Asia's ASEAN countries, Central Asia's countries, Persian Gulf countries, Southern Europe, Central and Eastern Europe (the countries that joined the 17+1 Initiative) and Central America.

64 global urban power centres were found, which are located in nation states and are important parts and hubs of the geopolitical force fields. Of the 64 global urban hubs, 5 are in Latin America, 3 are in Africa, 3 are in Australia, 12 are in North America, and 41 are on the Eurasian continent (with 20 in Asia and 21 in Europe).

The results obtained with the geofusion method show that in the multipolar world order, **not only countries have geopolitical and geoeconomic significance (although they play a central role), but so do the territories arising from regional cooperation**, economic and geostrategic power centres as well as global hubs and cities, which take on new importance owing to connectivity.

Figure 24.4: Geo-economic force fields by regions

Source: author's compilation



***THERE ARE TWO GLOBAL GEOPOLITICAL
FORCE FIELDS, NAMELY AMERICA AND
EURASIA, WITH TWO MAIN GREAT
POWERS ACTING AS GEOPOLITICAL
LEADERS, ALSO REFERRED TO AS
THE G2 COUNTRIES: CHINA
AND THE USA.***

REFERENCES

- Castells, M. (2005): *A hálózati társadalom kialakulása (The Rise of the Network Society)*. Budapest, Gondolat-Infonia. **Century**. Bantam Books, New York.
- Csizmadia, N. (2016): *Geopillanat, a 21. század megismerésének térképe (Geomoment: Map of the exploration of the 21st century)*. L'Harmattan Kiadó, Budapest.
- Kaplan, R.D. (2018): *The Return of Marco Polo's World: War, Strategy, and American Interests in the Twenty-First Century*. Random House, New York.
- Khanna, P. (2016): *Connectography - Mapping the Future of Global Civilization*. Random House, New York.
- Kurzweil, R. (2013): *How to Create a Mind: The Secret of Human Thought Revealed*. Penguin Books, New York.
- Matolcsy, Gy. (2019): *American Empire vs The European Dream*. Pallas Athéné Kiadó, Budapest.
- Salamin, G. – Csizmadia, N. – Gutpintér, J. (2016): *A 21. század megismerésének térképe (Map of the exploration of the 21st century)*. Hungarian Geopolitics, 2016/1. Pp. 44-51.

ACKNOWLEDGEMENTS

The authors and editors of the book are indebted to Governor György Matolcsy for producing the ideas on which this book is based and for initiating work on the book, as well as to Deputy Governors Csaba Kandrács, Mihály Patai and Barnabás Virág for their inspiring support.

Danóczy, Áron Drabancz, Márton El-Meouch Nedim, András G. Szabó, Péter Gábrriel, Réka Hamvai, Róbert Hausmann, Balázs Horváth, Gábor Horváth, Ágnes Horváth-Hajzer, Gábor Izsák, Katalin Juhász, Katalin Kis, Norbert Kiss M. Kiss, György Kocziszky, Pál Kolozsi, Emese Kreiszné-Hudák, Kristóf Lehmann, Ádám Martonosi, György Matolcsy, Koppány Nagy, Ádám Nyikes, Alexandr Palicz, Dávid Papp, Péter Sajtos, Balázs Sárvári, Zoltán Szalai, Katinka Szász, Szilveszter Tordai, Ferenc Tóth, Gergő Török, László Török, Bence Tringer, Balázs Varga, Márton Varga, Tímea Várnai, Balázs Vonnák and Krisztina Zanaty, and for their comments on certain chapters and for supporting the work of the authors András Balatoni, Csaba Balogh, Balázs Csomós, Bálint Dancsik, Dániel Felcser, Gergely Kicsák, Zsolt Kuti, Kristóf Lehmann, Tamás Nagy, Zsolt Oláh, Gábor Soós, János Szakács, Ákos Szalai and Judit Várhegyi.

The authors and editors would especially like to thank Kinga Lengyel for her editorial and coordination work.

The discussion paper was edited by Gergely Baksay, György Matolcsy and Barnabás Virág.

The outstanding graphic design and typesetting of the book is the work of Anita Nemes. The authors also wish to thank Katinka Cseh and István Csonka for their support in printing and logistics, as well as László Körtvélyesi for coordinating online publication, which were all vital in bringing this book to life.

THE NEW SUSTAINABLE ECONOMICS

The authors
(portraits on reverse)

Péter
Asztalos

Dániel
Babos

András
Balogh

Richárd
Bense

Zoltán
Bögöthy

Norbert
Csizmadia

Erika
Csongrádi

Bálint
Dancsik

Bálint
Danóczy

Áron
Drabancz

Márton
El-Meouch
Nedim

András
G. Szabó

Péter
Gábrriel

Réka
Hamvai

Róbert
Hausmann

Balázs
Horváth

Ágnes
Horváth-
Hajzer

Gábor
Izsák

Katalin
Juhász

Katalin
Kis

Norbert
Kiss M.

György
Kociszky

Pál
Kolozsi

Kristóf
Lehmann

Ádám
Martonosi

György
Matolcsy

Koppány
Nagy

Ádám
Nyikes

Alexandr
Palicz

Dávid
Papp

Péter
Sajtos

Balázs
Sárvári

Zoltán
Szalai

Katinka
Szász

Szilveszter
Tordai

Gergő
Török

László
Török

Ferenc
Tóth

Bence
Tringer

Balázs
Varga

Márton
Varga

Tímea
Várnai

Balázs
Vonnák

Krisztina
Zanaty

ISBN 978-615-5318-51-1



THE
AUTHORS

