Productivity of Contemporary Economies

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Theory and Evidence

Edited by

Anton S. Filipenko,
Oleksandra M. Moskalenko
and Yurii K. Zaitsev

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FOREWORD

In June 2017, the Institute of International Relations at the Taras Shevchenko National University of Kyiv held an international conference called "Productive ability of nations: Case of Ukraine."

This important event for the scientific community started a discussion on the problem of the productive capacity of countries. In particular, the researchers focused on the causes of variations in the productivity of different economies, conditions for and objectives of productivity growth in different sectors, the economic policy of governments to support national strategies for development and growth, promoting human development, and raising standards of living in modern conditions.

Obviously, the problem of productivity is familiar and relevant to the international scientific community. Economists from various scientific schools directly or indirectly study economic growth and development, multifactor productivity, labour productivity, capital productivity, the impact of IT on the economy, the effects of overflow, and much more on the productive capacity of the economy. The variety of economic research, its applied nature and the sophistication of the opinions of scientists are simply amazing. Today, we have access to big data, various databases and the latest methods of analysis, which allows scientists to conduct their research in the context of international comparisons, exchange views on the state of affairs and the state of the economy, agree or disagree with others, put forward new hypotheses, test these empirically to prove or disprove them, and select the most viable. At the same time, modern economic research focuses on an interdisciplinary approach, which greatly enriches the scientific results of these studies and their value for practice, including recommendations for governments, politicians and businesses on ways to increase productivity. It should be noted that the relevance of the interdisciplinary approach is dictated by the complexity of the problems that economists face today. The analysis of such problems with the use of an interdisciplinary approach in research allows the most viable and practice-oriented recommendations for the economy to be obtained.

In our opinion, the presented collective work on "Productivity of Contemporary Economies: Theory and Evidence" is a contribution to the development of theory and practice of productivity, and offers the results of original research in this area, which relate to associated scientific

problems. Namely, these are: the strategic goals of economic policy, the role of the institution of trust, the Fourth Industrial Revolution as a motivating factor for productive capacity, noosphere-thinking in economic development, methodological capabilities of institutionalism to analyse productive capacity Moreover, the authors contribute to the analysis of the productivity in the banking system and the role of banks in productive capacity, and the role of foreign investment in the productive capacity of countries and economic growth using the examples of Central and Eastern Europe, and Ukraine in particular.

The book focuses on the current trend of slowing global productivity, which is associated with changes in the technological mode of production as a result of technological developments during the Fourth Industrial Revolution. The problem of a country's productive capacity in a globalised society is complex, which can and should be studied taking into account economic and non-economic factors. Productive ability as an economic factor is closely related to productivity, which can be measured as labour productivity and capital productivity. Non-economic factors of productivity, which are equally important to consider in the analysis of productivity, include institutional, civilisational, social and motivational aspects.

According to the authors of this book, productive capacity should be considered from different points of view and taking into account national specifics. Setting strategic goals of the government's economic policy, aimed at increasing productivity in the national economy, requires a new theory of economic policy of living standards. Richard Thaler (2015) says that we live in a world of humans who are the vast majority of people, and therefore the level of productivity in the economy determines the opportunities to improve the quality of life and review the living standards of ordinary people on an ongoing basis. Accordingly, in the global economy, there is a rethinking of the values of economic development, as it becomes more value-oriented and based on the human-centric paradigm of development.

The COVID-19 crisis, which has highlighted the problem of slowing down the rate of growth of productivity and also the need to find and implement new methods of working and management approaches, is clearly contributing to the revision of development values. In the context of the pandemic crisis, the world's economies have become more vulnerable to shocks, established value chains have been disrupted and the incomes of the vast majority of economic entities have fallen sharply. There is an urgent need to find flexible and reliable innovations that will address vulnerabilities in value chains and other bottlenecks. The

international pandemic has been actively talked about as a "window of opportunity", which, acting as a shock to the economy, gives it a chance to open up new opportunities. On the agenda of developed countries, the EU in particular, was the question of the role of industry in society and the need for its restoration. "It will require an active, focused approach, a rethinking of the paradigms that underlie our understanding of how societies, economies and industries work," stated the report of the European Commission on the policy development of industry 5.0 (Breque 2021). It is important that globally politicians and opinion leaders directly or indirectly emphasise the need to revise the concepts of economic and social development towards a human-centred paradigm, and the need to combat poverty and economic inequality. At the same time, the basic model of development is a low-carbon economy, which is based on the rejection of environmentally hazardous energy sources, and sustainable development. The ideal conditions for the competitiveness of industry in the world are stability, a focus on people and sustainability, a focus on innovation, and digitalisation of all spheres of public life.

Thus, to increase productivity, a modern country must, first, formulate an economic policy that is able to create and provide favourable conditions for the preparation and implementation of innovations for the future, as well as a high level of "soft" investment in people; secondly, it should contribute to the formation of a society 5.0 that is able to meet the multifactorial challenges of the economy and society, and contribute to technological improvements and hence commensurate productivity growth. Technological improvements are an integral part of economic development. They meet the challenges, but they also pose the threat of technological substitution, which is a challenge for work and its future. Without further developing this discussion, it should be noted that in order to mitigate the challenges and threats outlined above, a necessary condition is a scientifically sound and strategically oriented government policy, an economic policy in particular, which should be conducted in the national interest and focus on productive incentives for politicians, officials, businesses and people (employees).As Tyrol noted, "by formulating goals, we will be able to find the tools to achieve them, especially if the conditions are conducive to them. As a result of the transformation, new bottlenecks are emerging. In the interests of society, new rules of competition and regulation of markets that take into account modern realities are needed" (Tirol 2020, 664).

It is important to note that we live in a world that is rapidly transforming, constantly experiencing shocks and crises, and the new socio-economic reality that is emerging before our eyes carries a key pattern: instability as a key trend. This imposes special requirements on

politics and economics as social institutions and areas of interaction between different countries, nations, social groups and people. Accordingly, economists must provide relevant recommendations that can improve our lives. I strongly hope that the scientific works of the authors of this book and their recommendations will serve as a theoretical and applied guide for economists and politicians – the authors set this as a goal and were very eager to improve such a complex world of economics to make it better for ordinary people.

Oleksandra M. Moskalenko

PREFACE

The productive capacity of economic systems at national and global levels in the 21st century is defined by a brand-new complex of challenges, factors and triggers caused by the rapid growth of scientific and technological revolutions, and the emergence of new demands and contradictions, which result in a dualism of the goals and values of people, businesses and society. Economic theory and economic policy meet new (frequently opposite) and rapidly developing paradigmatic approaches to the definition of the essence and content of these goals and their implementation methods that do not always correspond to the long-term strategic interests, preservation and evolution of human civilisation on Earth, as well as the steady growth in population prosperity.

In these circumstances, the scientific analysis of the nature of the above-mentioned problems envisages the definition of the state and the level of readiness of productive powers and social economic relations of both certain countries and globalised society in general for the extremely qualitative leap to the development of the technological productive method. It also covers the transformation of its results into the new quality of welfare and self-reproduction of members of society. Moreover, this engages the research in endogenic factors slowing down the innovative advancement of productive capabilities of individual national economies, and risks resulting from the systematic application of the nanotechnological revolution and Industry 4.0. Such an approach to scientific analysis will encourage deeper understanding of the principles of building the architectonics of theoretical and practical patterns of economic policy that would be able to implement the human-centred paradigm of social development.

Therefore, the authors of this paper have focused on the investigation of core categorial and institutional forms identifying the nature and functions of the productive capacity of national economic systems, and strategies for applying the manufacturing potential in the context of constant qualitative transformations, which take place in the economy and society affected by the above-mentioned revolutionary changes in the technological method of production, and in the character and essence of social relations between key economic activity agents and all members of globalised society.

The latter aspect is quite crucial because, according to G. Hodgson, "When it comes to technology definition and transformation issues, the orthodox economic theory interprets the technology as something prescribed and lack of social content as if the technology has nothing to do with both the system of relations in manufacturing and methods for organizing labor within the firm. Technology is perceived as a natural phenomenon that should be studied as part of any social science." (Hodgson 2003, 43) At the same time, we cannot but agree with scientists who are warning nowadays: "Future is Pandora's box that, unfortunately, we cannot help but open." (Yemelin 2017, 350) Such challenges and risks for the future of humans are also confirmed by the emergence and dynamic development of dualism in the understanding of the essence of the high-priority growth paradigm in research by theorists, business views and the activities of authoritative structures in different countries. It refers to the problem of choice that is faced before society's leap into the unknown future based on new productive capabilities of economic systems – either a human-centred development paradigm, a transhumanistic development paradigm, or a dialectic harmonious combination of the two in a single conceptual system of views, prospects and routes for the evolution of human civilisation. This issue has to be, and is, the scope of research in this manuscript.

Yurii K. Zaitsev

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We express our sincere gratitude to the authors of the chapters, who made great efforts to achieve the unity of the theoretical idea of this work, and who were interested in its fate and contributed greatly in every way to its publication. Furthermore, we would like to thank the young scholar Oleksandra Moskalenko, whose volunteer work and inspiration made this book possible.

INTRODUCTION

ANTON S. FILIPENKO

Productivity is a key economic indicator, which identifies a state of development on micro-, meso-, macro- and meta-economic levels. Nowadays, the economic situation around the world is characterised by the tendency for productivity growth to decrease, stipulating, on the one hand, digitalisation of economic processes and, on the other hand, the consequences of COVID-19. We now have a *sui generis* productivity paradox, according to K. Shwab (2016, 32). In as much as many goods and services have zero marginal costs via digital platforms (blockchain, IoT, big data, artificial intelligence), traditional statistics do not reflect real productivity, which is followed by lower prices. Under the conditions of COVID-19, the world's GDP in 2020 decreased by about 6% and its productive ability – particularly in terms of labour – was diminished correspondingly. The crucial task of this book is to explore productivity in contemporary economies, particularly of labour and capital and their combination in terms of total factor productivity and multifactor productivity.

Chapter One focuses on classical interpretations of productivity by A. Smith and J.S. Mill, mostly in light of the division of labour. J. Turgot, J.H. von Thünen and T. Malthus considered the problems of productivity in the narrow sense, mainly limited to the productive capacity of agriculture. Among the main measures of economic productivity, the theory of marginal utility (productivity) was stressed. In modern research, aggregate indicators such as total factor productivity (TFP) and multifactor productivity (MFP) prevail. TFP is measured by combining the effects of all the sources used in the production of goods and services (labour, capital, materials, energy, etc.) and dividing this by the output; thus, it utilises more than a single factor. MFP is the ratio of total output to a subset of inputs. A subset of inputs might consist of only labour and materials, or it could include capital. MFP is the residual contribution to output growth of an industry or economy after calculating the contribution from all its factor inputs. The OECD methodology examines key single-factor (aggregated) indicators of labour and capital productivity,

considering total output and costs and, most importantly, the value added, which reflects the real increase in the welfare of the nation. The European KLEMS project (model) uses such components as energy, materials and services, in addition to labour and capital. Canadian experts offer a much wider range of indicators in the measurement of TFP.

In particular, there are intermediate costs (materials, business services, loan capital), labour costs, renewable capital costs, inventories (material values), land resources, other natural resources (fish stocks, forests, oil fields, mines), environmental improvements, working capital, cash and other financial instruments, knowledge capital (education, innovation, R&D, etc.), and infrastructure capital. A set of factors of national productivity is considered in a detailed version. Firstly, these include: the accumulation of capital by attracting domestic and foreign investment; introduction of the newest technologies capable of modernising manufacturing; and organisation of production and technological processes comparable to the best models in the world. Secondly, they are deepening the division and cooperation of labour in the system of network chains at the national and global levels at different stages of production and distribution, creating effective coordination mechanisms for prices, contracts, formal and informal agreements, communications, trust, reputation, and more. Thirdly, they relate to the development of production infrastructure (transport, energy, telecommunications) and improvement of social infrastructure, including public institutions, non-governmental organisations, and business and social networks, etc. Fourthly, this means increasing the educational level and competence of those employed in the economy, which, according to some calculations, is pivotal in increasing productivity.

Chapter Two examines the Fourth Industrial Revolution as a motivator for a great leap in a country's manufacturing capability, in particular in terms of international experience, challenges and risks in Ukraine. As Zaitsev observes, the most powerful technological revolution in the history of modern society, creating the background for meeting the entirety of critical and long-term demands of economic and social life subjects across the globe, is simultaneously providing brand-new manufacturing capabilities and tools to affect the processes of managing the life of these "human beings" and their mind, desires, emotions, etc. The rapid integration of nanotechnologies, atomistically precise manufacturing and robotic automation result in the dynamisation of qualitative changes in labour requirements, conditions to ensure the quality of human labour, etc. At the same time, there is an increasing number of external challenges, in particular technological, structural, geopolitical, technologically geopolitical, global-ecological and civilisational challenges. This is in addition to those

related to: mass social mutations (glam-capitalism, downshifters, a long-term unemployed population, internal 'unemployed – principals' and 'unemployed – migrant principals' as a widespread phenomenon). Moreover, this is also related to politics and economics (aggravation of social and socio-technological competition, and the emergence of a dualistic development paradigm (human-centred or transhumanistic) of the economy and society). According to the author, the main problem in the context of scientific revolution and the digital economy is the decline, or even the loss, of the totality of such civilisational labour function, as its affordability and continuity of reproduction for a significant number of people worldwide – which will complicate human socialisation processes, and conditions for self-actualisation and creative development – turn many people into outcasts or pariahs within the operating society.

Chapter Three by A.M. Kolot and O.O. Herasymenko observes the institution of trust in the system of factors in the development of a nation's productive ability. The authors have focussed on a literature review in this area and also modern methodology. It should be noted that Ukrainian society has been in a state of political, economic and social instability for almost three decades, which is reproduced and permanently intensified not only by external global trends but also by internal crisis phenomena. The internal component of instability in Ukrainian society is closely linked to, and largely the result of, the inconsistency, uncertainty and unpredictability of domestic and foreign policies. The authors are convinced that new ways to solve the most acute socio-economic problems are connected to the potential use of non-economic factors, among which trust has a special role. In the new development trend, which is gaining momentum, there is an actualisation of the moral and spiritual non-economic component. In their recent research, the authors proceed from the fact that purely economic postulates are appearing less and less in the form of material from which to build the current and future economic lives of the country, households and each person. To conclude, trust in the economy is based on an extensive system of formal and informal norms and institutions/organisations. There is every reason to consider the institution of trust as a tool for regulating relations in the triad of "market – state – business", the formation and development of which – in the context of the interaction of participants in the coordinates of the new economy – were substantiated.

Chapter Four by I.G. Khanin is devoted to noospheric thinking as a factor in economic development. Noospheric thinking is presented here by its ontological basis in the form of the Quasi-Physical Model of Cognition (QPMC) of the noosphere. The model is convergent, since it is assumed that the noosphere includes the biosphere and the biosphere includes the

physiosphere. The QPMC model includes the structure of the noosphere as a relevant scheme of the object of cognition with horizontal (interdisciplinary) connections between the spheres of phenomena (physiosphere, biosphere, noosphere). Vertical relations are established between the levels of abstraction (philosophy, methodology, mathematics, fundamental and applied knowledge, technology, practice). QPMC, at least, can serve as the basis for strategic planning, forecasting, and optimisation of economic management and cognition. The explanatory and predictive power of models and theories mentioned by the author are closely related. The explanatory power of the cognition model allows us to understand what is happening with cognition of the sphere of phenomena today. Predictive ability helps us to anticipate what events might occur during development. This should ensure that false paths and goals are avoided, as well as ensuring that the real problems are posed and addressed. The model provides the convergence of knowledge of physical and humanitarian phenomena, as well as abstract and concrete, embodied and non-embodied knowledge. At the same time, it shares practical and scientific knowledge. Practical knowledge relies on experience (analogies), guesses (heuristics) and modelling (associations). The chapter contributes to materialised forms of knowledge, which act as objects of paradigmatic and scientific knowledge. The QPMC model does not claim to be complete. The author is aware that in the process of implementation it may require changes, and looks forward to arousing interest in this topic and stimulating discussions.

Chapter Five by O.M. Moskalenko points out that strategic goals of the economic policy of the state are connected to the production ability of the national economy in a globalised society. These strategic goals are considered in the policy of raising the standard of living, and thus ensuring the institutional, economic and political conditions for economic growth and the productive capacity of the national economy. It is proved that catching-up economies, due to their low productive capacity and poor international competitiveness, will be unable to create the appropriate institutional conditions for economic growth or fit into international technological chains. Besides, the post-transformational countries (Ukraine) have implemented an outdated form of state monopoly capitalism and, thus, condemned themselves to decades of catching-up development with a faintly degrading character. It is argued that institutional inadequacy, political instability, low productivity and the immaturity of institutions in countries with a low level of economic development have led to such a situation. A globalised society is an unstable meta-system that is constantly transforming, producing qualitatively new goals and values for the development of civilisation. The political role and economic

position of national economies in a globalised society is determined by the level and result of the productive capacity of a nation that is capable/incapable of producing the civilisational and cultural values (that are perceived by the majority, including other nations), innovations, effective economic results and solutions, and social stability and development.

The economic growth strategy involves organising such a set of factors that would ensure a steady growth rate over the long run, either due to the benefits created by resource availability, or due to technological superiority and high productivity, or a combination of these two components. Consequently, the productive capacity of a nation in a globalised society is determined by the economic (existing in the country and created resource-supply), technological and non-economic (related to civilisation) advantages.

V. V. Lypov in Chapter Six investigates the contemporary institutionalism and instruments of comparative analysis of the productivity of national economies. The purpose of this section is to analyse features of the tools for studying the productivity of national economies, proposed within the main areas of comparative research of institutional models of socio-economic systems, and to identify their limitations, advantages and disadvantages in the context of forming a holistic view of universal institutional mechanisms to ensure high productivity of national economies. Comparative analyses of the productivity of socio-economic systems are grounded on the concepts of the varieties of capitalism (VoC), social systems of innovation and production (SSIP), national business systems (NBS), French school of regulation (TR), institutional matrices (IM), and institutional complementarity (IC) of socio-economic systems (SES). Instruments of comparative analysis such as structural, functional, systemic, dialectical, quantitative, qualitative, historical-genetic, graphical, and ethno-metrical analysis methods of formalisation and modelling are used.

The methodological bases of comparative complementary research of institutions are qualitative (analysis of the impact of values on the nature of structural complementarity), quantitative (analysis of indicators characterising the complementarity of individual institutions and institutional areas of SES), measurement (complementarity measure). The study of structural complementarity (SC) involves the analysis of the correspondence of the elements of the institutional system to the value foundations of the national culture. The study of functional complementarity (FC) is based on the analysis of the functional unity of the elements of the institutional system. In turn, system analysis presupposes research SES in general, their individual components analysis as integral phenomena. But dialectical method focuses on dialectics of complementary relations at the level of

basic SES institutions and historical-genetic – on evolution of complementary principles of production methods. The analytical apparatus of comparative studies includes graphic (figures that characterise the structural and functional relationships between institutions), econometric (measurement of institutional complementarity at the SES level), ethnometric analysis (using the results of ethnometric studies of value orientations of national cultures), and methods of constructing graphs (morphology of institutional interaction).The advantage of comparative complementary analysis is the ability to predict the qualitative characteristics of institutions inherent in certain SES models, based on knowledge of the key principle of their operation.

The analysis of the components of institutional systems is deepening. The influence of the features of the institutional structure for ensuring the growth of productivity is the centre of attention of researchers. Deductive and inductive approaches to comparative analysis of the impact of different models of economic systems and their components on productivity are being developed. Depending on the purpose and the available information base, researchers have the opportunity to choose a wide range of methods and tools of analysis.

The effects of foreign direct investment (FDI) on labour productivity are explored by O. Nosova in Chapter Seven. The paper aims to understand the effects of FDI on the labour productivity of local firms and to identify factors that will support the development of a more effective policy to encourage attractive FDI practices in Ukraine. The FDI inflows affect and promote change in labour productivity. The higher wage rates lead to increasing aggregate demand. The greater investment, with improvements in total productivity, could reinforce Ukraine's current account balance. The greater technological transparency of the information society emerging in European countries, as well as growing intra-European bilateral FDI links, have contributed to an increasing incidence of technology spillovers and external-scale economies. Foreign capital inflow increases the level of employment, the qualifications of the local labour force and the productivity of its labour, and it also improves the standard of living and purchasing power of the population. The effects of FDI on host countries' economies are mainly related to the increase in labour productivity through technological transfers, management and marketing proficiency that enables long-term technological progress and economic growth. The author proves that the development of performance management skills according to the standards imposed by the major leading corporate systems, an increase in the population's training level and its capacity to adapt to the technological developments can contribute

to the increase in the quality of labour resources.

The authors of Chapter Eight, S. Tsyganov and N. Tsyganova, have studied banks and their role in the system of resource provision for the productivity of countries. The banking system of Ukraine, according to the authors, has passed the initial stage of its formation, but it shows a significant backlog in terms of the economy's needs: increased sensitivity to external shocks, structural imbalances, and limited resource opportunities for the real sector lending, especially of medium- and long-term credits.

The role of banks in the system of resource provision for the countries' productive capacity is determined by the quantitative and qualitative parameters of the resources according to the business needs and general macroeconomic parameters. The capacity of national financial markets determines the number of resources that are redistributed on the basis of the market mechanisms such as free market pricing, voluntary exchanges and competition.

This means that a change in the number of banks ambiguously affects their role in the resource provision system for the productive capacity of countries. Resource capabilities of individual banks depend on the number of banking institutions and the level of consolidation of the banking sector.

In the current context, the chapter concludes, consolidating the capital in the banking sector is essential for the formation of the resource provision system for the productive capacity of national economies, which is based on a number of objective and subjective factors, among them being a prominent place occupied by technological changes in production that require large amounts of funding.

Chapter Nine by O.A. Chugaiev is about foreign investments and business regulation in small and large economies. This chapter reviews the results of research on the effect of economy size on international investments. But it is also necessary to verify the robustness of previous findings by using more recent data. Thus, analysis of variance (ANOVA) was applied to the data after the economic crisis of 2008–2009. Also, unlike the traditional classification of countries, medium-sized economies are distinguished in the current study. Most of the analysed indicators do not have a proven optimal range of values in order to maximise economic growth, or at least the differences are not statistically significant (these indicators are: inflows of FDI, portfolio investments in bonds, real interest rate, tax rates, corruption incidence, simplicity to register business start-ups, obtaining electricity, enforcing contracts and resolving insolvency, legal rights of borrowers and lenders, transparency in the public sector, bank capital to assets ratio). The author concludes that in recent years the attractiveness of Ukraine for foreign investments was negatively affected

by the existing economic dynamics but also positively affected by the low value of assets. Also, despite Ukraine having a wide range of industries, its economy is not large enough to provide efficiency for some of the branches. This is also related to the investment options being limited by other criteria (riskiness, payback period, shadow economy etc.) i.e. the country does not possess all the types of assets in order to satisfy the needs of investors (those who prefer specific industries, long-term investments, or avoiding risks or corruption). The high volatility of production in Ukraine also makes it similar to small economies and curbs foreign investments.

The productive efficiency and economic growth in the countries of Central and Eastern Europe are the subjects of Chapter Ten by Bilenko. After many decades of experience in post-socialist countries, the economic development in a market economy allows research on the models of productive efficiency and economic growth, and their correspondence with classical exogenous and new endogenous theories of economic growth, to determine the dominant factors of the trajectory of development of countries in different institutional environments. This study tries to measure the efficiency of the economic performance of Central and Eastern European countries in a period of economic reforms and transition to a market economy, and to explain what factors play an important role in the economic performance changing. For the analysis, a group of 10 countries of Central and Eastern Europe that have joined the European Union (Bulgaria, Romania, Poland, Hungary, Czech Republic, Slovakia, Slovenia, Estonia, Lithuania and Latvia), as well as four post-Soviet European countries (Ukraine, Belarus, Russia and Moldova) and Albania, were selected. In the sample, for efficiency estimation the most productive countries in the world, USA and Germany, were also included. Research was conducted over the period 1991–2013 (390 observations). Results of the research confirm Parente and Prescott's (2000; 2005) theory of country-specific TFP, which they refer to as a theory of relative efficiency which is based on policy differences. More specifically, they show how various policies that constrain choices of technology and work practices at the level of the production unit determine the aggregate efficiency at which a country uses its resources in production.

List of Abbreviations

AR	Average revenue
ATM	Automated teller machine
CA	Comparative analysis
CAI	Comparative analysis of institutions
CCA	Consciousness, cognitive-creative activity
CIA	Comparative institutional analysis
CIS	Commonwealth of Independent States
ESA	Enterprise and systems architecture
ES	Economic systems
EU	European Union
FC	Functional complementarity
FDI	Foreign direct investment
GMM	Generalised method of moments
GUF	German–Ukrainian Fund
GDP	Gross domestic product
GNI	Gross national income
GVC	Global value chain
IMF	International Monetary Fund
IC	Institutional complementarity
IM	Institutional matrices
IT	Information technology
LP	Labour productivity
KFW	German Reconstruction Credit Institute
M&A	Mergers and acquisitions
MFIs	Microfinance institutions
MFP	Multifactor productivity
MPP	Marginal physical productivity
MNEs	Multinational enterprises
OOAD	Object-oriented analysis and design
PIDev	Paradigmatic innovative development
PPP	Parity of purchasing power
QPMC	Quasi-Physical Model of Cognition
RT	Regulation Theory

SES	Socio-economic systems
SME	Small and Medium-sized Enterprises
SC	Structural complementarity
SOVS	Social orientations of value systems
ST	Semantic technologies
TFP	Total factor productivity
TNCs	Transnational corporations
TPP	Total physical productivity
TPBP	Theory and practice of business processes
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Educational, Scientific and Cultural
VAT	Value-added tax
VMP	Value (cost) of marginal productivity
VIPK	Vertical integration and the parabola of knowledge
VoC	Varieties of capitalism
WGI	Worldwide governance indicators

CHAPTER ONE

PRODUCTIVE ABILITY OF THE ECONOMY: THEORY AND METHODOLOGY

ANTON S. FILIPENKO

1. Classical interpretations of productivity

The common notion of productivity is defined as the ratio of output to resources expended. The productive capacity of the economy, or the productive capacity of nations, is a much broader multidimensional process. It reflects the general state of the economy, the efficiency of use of all resources, the nature and level of the institutional environment, the quality of human and social capital, and so on.

The forefathers of economics paid great attention to the problems of the creation and distribution of wealth, and the welfare of nations, determining the causes, nature and factors influencing these processes. Particular attention was paid to the efficient use of land, labour and capital. Among the main prerequisites for the economic capacity of a nation were the natural and geographical environment, the level of development of material and spiritual culture, the division of labour, international trade, and others. At the same time, A. Smith (2001, 11), in particular, stressed that "the greatest improvement in the productive powers of labour, and the greater part of the skill, dexterity, and judgement with which it is anywhere directed, or applied, seem to have been the effects of the division of labour." Smith mainly considered the firm (factory, manufacturer) from the point of view of the division of labour (organic and heterogeneous manufacturing) as the main factor in productivity growth. J.S. Mill analysed productivity through the prism of property relations and the cooperative nature of the social institution, dividing the productivity of the worker and the manager depending on their ownership of the means of production (Witztum 2012, 342-343). Mill distinguished simple cooperation, when workers carried out joint activities in the process of producing one

product (vertical relations), and complex cooperation, when different products are produced for exchange (horizontal relations). According to Mill, the scale, size and limits (boundaries) of a firm are determined by the following components: technological conditions, the impact of distribution relations on productivity, the transnational nature of competition and the evolution of human nature (ethology). J.M. Keynes (2007, 43) critically evaluated the category of wealth, its dynamics and structure in the definitions of classical economists, in particular noting the descriptive nature of their interpretations.

J. Turgot, J.H. von Thünen and T. Malthus considered the problems of productivity in a narrow sense, mainly limited to the productive capacity of agriculture. The law of declining productivity of the agricultural sector (soil) was formulated. G. Hegel and F. Engels divided different nationalities into "historic" and "non-historic" in terms of their ability to yield economic and cultural development. While the historic nationalities created states and were entitled to exist, the non-historic nationalities were doomed to extinction. The fallacy of this statement is obvious, because in the historical process, state and civilisation structures were created, destroyed and restored (Toynbee 1995, 252-254).

2. The main measures of economic productivity

2.1. Theory of marginal utility (productivity)

Over time, the issue of wealth was transformed into a standard category of gross domestic product, while the issues of its generation were localised by the competitiveness of nations (Porter 1990) and by the study of the productivity of two main factors: labour and capital. In fact, during the second half of the 20th century and at the beginning of the 21st century, the productive capacity of a nation has been grounded mainly upon models of total factor productivity (TFP) or multifactor productivity (MFP).

To better understand these complex categories, let us consider the basic principles and concepts with reference to the theory of marginal utility (productivity) in the context of the marginalism paradigm that led to the second revolution in economics. Measuring marginal productivity is carried out gradually in several steps. First, the general formula of marginal physical productivity is determined:

$$MPP_n = TPP_n - TPP_{n-1} \quad (1)$$

where MPP_n is the marginal physical productivity of the n-th unit of labour;

TPP_n is the total physical productivity of the n-th number of workers;

TPP_{n-1} is the total physical productivity of the n-1 unit of workers.

Marginal physical productivity means an increase in output caused by one factor of productivity while the other remaining factors are unchanged. An illustration is provided as follows. Six workers produce 120 quintals of wheat (120 quintals / 6 workers = 20 quintals per worker). If another (seventh) worker is involved in production, the wheat harvest should total 140 quintals. In this case, the maximum physical productivity of an additional employee is 20 quintals (140 − 120 = 20). At the same time, there may be situations when the seventh employee may have lower productivity (lack of additional equipment, lack of experience, physical capabilities, etc.), then the question arises whether it is feasible or not to attract an additional unit of labour in the context of marginal utility theory.

Marginal revenue productivity is defined as the increase in total revenue due to the attraction of a unit of additional factor upon the invariability of other factors. Suppose that one worker produces wheat resulting in revenue of $50. Another worker is hired and as a result the revenue increases to $60. In this case, the marginal revenue productivity of the second worker equals $10 ($60 − $50 = $10).

The value (cost) of marginal productivity is equal to the product of marginal physical productivity and the market price of the product:

$$VMP = MPP \times AR \quad (2)$$

where VMP is the value of marginal productivity;

MPP is the marginal physical productivity;

AR is the average revenue (market price of the product).

If the market price of one quintal of wheat is $10 and the marginal physical productivity of the first additional worker is 20 quintals of wheat, then the marginal productivity of the additional worker will be equal to $200 (20 x $10 = $200).

2.2. Total factor productivity and multifactor productivity

Measuring productivity is a complex process that has its own history, initiated, as noted above, by the forefathers of economics (Malthus, Smith, Marshall, etc.). In modern research, aggregate indicators such as TFP and

MFP prevail. TFP is measured by combining the effects of all the resources used in the production of goods and services (labour, capital, materials, energy, etc.) and dividing it by the output; thus, it utilises more than a single factor. MFP is the ratio of total output to a subset of inputs. A subset of inputs might consist of only labour and materials, or it could include capital. MFP is the residual contribution to output growth of an industry or economy after calculating the contribution from all its factor inputs.

The OECD provides a tabular version for measuring the performance of essential elements of the economic system (see Table 1-1).

Table 1-1. Measuring the productivity of the economic system

Type of output	**Type of input measure**			
	Labour	Capital	Capital and labour	Capital, labour and intermediate inputs (energy, materials, services)
Gross output	Labour productivity (based on gross output)	Capital productivity (based on gross output)	Capital-labour MFP (based on gross output)	KLEMS* - MFP
Value added	Labour productivity (based on value added)	Capital productivity (based on value added)	Capital-labour MFP (based on value added)	
	Single factor productivity measures		MFP measures	

* The model has resulted from the work of a consortium of 16 research, analytical and statistical organisations from different EU countries established in 2003 (the project has been titled EU-KLEMS).

Source: OECD 2001. "Measuring productivity. Measurement of aggregate and industry-level productivity growth," Paris p. 12.