Introduction

Another "Grand Illusion"— Optimizing the Central Plan

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The main thrust of our series *Revisiting Communism. Collectivist Economic and Political Thought in Historical Perspective* has been twofold: to tell unknown stories and warn about the dangers of their repetition.

The first volume in the series (Kovács ed. 2018) discussed the evolution of the economic concepts of ownership. It focused on the utopian idea of social property and the "trap of collectivism" that prevented most economic theorists in the communist countries (and a significant minority beyond) from acknowledging even the obvious advantages of private ownership. Our contributors unveiled much of the mystery around the concept of social property in nine country studies.[1] In the real world of communism this concept worked as a party-state (*nomenklatura*) property that succeeded to populate, in the wake of sweeping nationalization and collectivization, a no man's land of ownership. Although *nomenklatura* property was complemented by various types of cooperative/communal ownership and combined with formal and informal varieties of private ownership in all countries, it stultified the imagination of economic theorists for decades to come. Regardless of the inefficiency and injustice of social or mixed (collective and private) property, they made enormous efforts to keep various blends of these on their scientific agenda.

Staying in such a trap could not be explained exclusively by a servile submission to (self-)censorship; it was also motivated by genuine scholarly and ideological convictions. Also, Eastern Bloc economists did not necessarily emulate the half-hearted attempts of their Soviet colleagues to exit the

trap. Instead, their research programs resulted in a number of remarkable local solutions combining vertical and horizontal forms of collectivism with a light version of economic individualism/liberalism.[2] Usually, the emerging patterns of ownership were rather unoriginal and unsophisticated in terms of economic theory. Nevertheless, they offered posterity precious information gained from the gigantic testing ground of the Soviet empire about intermediary configurations between the principles of collectivism and individualism.

A Greek Tragedy?

In thinking about social ownership, we were cognizant of the importance of another basic concept of Marxist-Leninist political economy: central planning. The fact that today new authoritarian regimes in former communist countries show no scruples whatsoever to resort to policies of nationalization, state-led development programs, macro-regulation with targeted interventions in business life, and the like has to do, among other things, with the half-contested legacy of communist planning. Following 1989, the idea of mandatory macro-planning seemed to disappear forever, leaving virtually no intellectual history behind. The destiny of one of the "travel companions" of the doctrine of social property, namely, the theory of planned operation of that property from an imagined center of the party-state, has not been explored yet. Thus far, a small library has been filled with literature on the economic history of thousands of central plans of various lengths, which were issued in the communist world during the twentieth century. However, the books and papers dealing with the *concepts* of these plans and Soviet-style planning in general can be squeezed into a bookcase while the works (predominantly journal articles) covering the *history* of planning concepts do not occupy more than one of its shelves. Since 1989, a whole generation of scholars who have become top economic advisors and decision-makers in the ex-communist states still do not have a chance to evaluate the risks of rehabilitating even strongly interventionist ideas like central planning—a once perhaps innocent goal that proved unfeasible if not fatal to communist economies. We hope this volume will help some members of this generation think twice before they venture to make similar experiments, chasing dreams about the success of their national plans of "salvation," "reconstruction," "development," or "cooperation."[3]

Long before the Soviet era (and even before Marx tried to wrap communist thought in the scientific discourse of classical political economy), a Grand Illusion was born. As an organic ingredient of the Enlightenment-based vision of modernity, the goal of managing the economy as a whole enchanted a vast number of scholars and politicians all over the globe during the past centuries, did not die out entirely after 1989, and may return with a

vengeance. With time, this goal was complemented by the illusion of planning (or "plannability"), reflecting a misguided trust in the omniscience and omnipotence of the proverbial Central Planner.[4] Famously, Marx and his early followers cherished the idea of a certain kind of decentralized and voluntary planning implemented by a horizontal network of self-managing communes (while, paradoxically, also advocating the principle of a centrally planned allocation of labor, capital, and goods in an economy organized hierarchically like a large enterprise). Furthermore, they claimed that planning the national economy in the "anarchistic" world of markets dominated by private ownership would be a *contradictio in adiecto*. However, really-existing socialism[5] taught economists to make distinctions among many kinds of ownership called "social"; and these could merge with multiple forms of planning, some of which were not even called "central." The present volume focuses on a particular type of planning concept, sometimes called "classical Stalinist planning"[6] and more acutely, on the ways of its "improvement" ("modernization") via advanced mathematical methods. In what follows, let me share some of our key working hypotheses and research questions.

Similar to the conundrum of social property, we were interested in the evolution of a widespread, lasting and—in a sense—workable invention in social engineering, namely, the concept of imperative and centralized macroeconomic planning.[7] While not ignoring the unbroken hegemony of verbal techniques of planning,[8] we have made great efforts to comprehend in an East-East comparison why and how a mathematically intensive research program, the theory of optimal planning,[9] grew out of the concept of central planning and, despite its poor performance in real life, succeeded in preserving some of its scholarly power until the last breath of communism. A rare development as it was, optimal planning models succeeded in catapulting economic thoughts and methods—invented to overcome the dire straits of Soviet-type planned economies—into standard economics in the West. Probably, this could not have happened if simultaneously similar models had not been formulated in the West[10] during the Cold War, and there had not been a growing exchange of ideas between the two blocs, epitomized by the Nobel Prize shared between Leonid Kantorovich and Tjalling Koopmans in 1975.

In this way, the Grand Illusion of central planning assisted the birth of an even grander one, the convergence of capitalism and communism. The convergence theorem anticipated not only a compromise between social and private property or between dictatorship and democracy but also a rapprochement between imperative and indicative regimes of state planning and between different designs of market institutions. This may remind the reader of hopes about the universal validity of a related hybrid project, market socialism, that, in various verbal forms, became a flagship initiative among a growing number of economists in the communist world *after* optimal

planning had begun to ail in practice. In their view, there remained no other means to improve the plan than a partial rehabilitation of market institutions.[11] This—perhaps less utopian—project surfaces throughout this volume but will be discussed at great length in our third collective volume examining the evolution of market concepts in the communist era.

Talking about illusion and utopia promises no happy ending in the history of a research program that was supposed to shine light on collectivist thought by linking the economic rationality of planning to Mathematical Science (writ large) in a positivistic mood. Instead of expecting rational economic behavior from allegedly instinctive market agents or from allegedly omniscient state bureaucrats, the pioneers of optimal planning were confident about introducing rational planning procedures based on indisputable mathematical truths that were embedded in formal models. They assumed almost axiomatically that these models could be construed by the experts and conveyed to the Central Planner who would put them into practice, and the entire process of revealing, producing, mediating, and synthesizing scientific information as well as taking decisions on their basis would imply hardly any ambiguity and frictional loss. The *Gosplan*, or any national planning office in the Soviet bloc, was thought to act as a Walrasian auctioneer[12] coordinating supply and demand (rather than prices) until general equilibrium was reached. Similarly, the hierarchical institutions of the party-state, including the state-owned firms, were presumed to execute the central plan almost impeccably. Another hypothesis breeding hope for rational outcomes was that the data to be fed into the models would be both available and correct, that is, they would exist when planning begins and would not be severely distorted or concealed by any economic actor. Both the input-output tables that served as the "infrastructure" of the optimal models and the constraints and the objective functions of the latter seemed to be defined fairly unambiguously and reflect a common good. In János Kornai's (1975, 426) words, the optimal planners were fairly certain that they would not have to "throw stones in the coffee mill."

Even as expectations became much less romantic over the years, many mathematical economists[13] continued to put their faith in (a) superseding the primitively verbal methods of planning *without* abolishing central planning as such; (b) converting the Marxist-Leninist political economy of socialism into a veritable scientific discipline equipped with precise research questions and hypotheses, appropriate model-building, and procedures of accurate measurement and verification *without* joining, heart and soul, the neoclassical mainstream in the West; and (c) improving the performance of the planned economy *without* having to introduce a capitalist market economy. In the end, this *par excellence* technocratic (and, for a long time, expressly pro-communist) project failed dismally in all the three respects.

Verbal planning managed to preserve its dominance. Although official political economy lost much of its influence in some countries, the harm it had to suffer was caused by the theories of market reform confirming certain liberal tenets, that is, by theories, with which the mathematical economists did not want to flirt initially, rather than by the standards of mathematical exactitude. Finally, while input-output analysis contributed to raising the quality of central planning, optimization did not have a chance to show its strength in real life on the level of the national economy in any of the states under scrutiny.

Thus, the original mission of optimal planning proved impossible but—paradoxically—in the eyes of the "missionaries" it was not entirely unsuccessful. The neoclassical mainstream did *not* inundate economic thought in the communist world despite the fact that they opened a few of the flood gates. Moreover, no matter if cautiously liberal ideas appeared in the optimizers' research programs, they did not have to fear for decades that they or their more radical rivals, the market reformers would feel the urge to "jump" into capitalism. At the same time, as an unintended consequence, mathematical culture managed not only to slowly permeate but also uproot economic research and education in some of the communist countries. Exactly half a century after Kantorovich published his first booklet on *The Mathematical Method of Production Planning and Organization* in 1939, this culture alleviated the post-1989 breakthrough of neoclassical theory[14] in the former Soviet empire. In a sense, optimal planning accomplished an altruistic task in the long run: it provided mathematical economics with an expanding habitat, helped a small sect of scholars grow into a genuine academic community with established institutions, enabling them to survive communism and prosper in the framework of other research programs afterward.

This volume could suggest a drama in two acts: finding rationality, then losing it. However, the country chapters show that, as always, life was much more complicated. First, this two-phase sequence was characteristic of optimal planning rather than planning in general and other fields of mathematical economics. Second, the rise and the fall of somewhat rational planning concepts were sometimes difficult to take apart because—while certain (overambitious) models of optimal planning failed—others promised favorable results. The Conclusion will show what we did not really expect in the beginning, namely, that several causes of the fall of the research program were preprogrammed in its rise. Third, the concept of rationality did not fade away completely during the second act but survived under the aegis of other research programs of mathematical economics (e.g., disequilibrium analysis), and of verbal studies (e.g., market reform or even futurology). Fourth, and most importantly, the optimizers had focused not on rationality as such but on a *particular* type of it. Instead of searching, to cite Max Weber, for both value rationality and instrumental (goal) rationality, they were fascinated by

the latter, more exactly, its situation-based and procedural varieties. Friedrich Hayek would call it "constructivist rationalism."

Some hoped that goal rationality would combine with value rationality, that is, the improved planning regimes would raise the well-being (including some economic freedoms) of their fellow citizens. For a long time, the loftiest value in the eyes of optimal planners was the protection of the communist system in the Cold War that not only justified the modernization efforts of the experts but also supplied them with cutting-edge techniques in analysis developed together with the military. Otherwise, their value judgements concerned the rationality of science in itself. In other words, they confined themselves to ensuring the correct application and refinement of these techniques rather than assessing the economic system they wanted to plan as inferior to capitalism in terms of both efficiency and freedom.[15]

Seeing the title of the Conclusion in the table of contents, one might expect to read into a huge intellectual and emotional tension between the phases of finding and losing rationality. Still, the destiny of optimal planning did not genuinely follow the logic of Greek tragedies: it lacked a cathartic climax before the end. The hero's rise was not interrupted by spiritual enlightenment and self-purification and it was not followed by a sudden and disastrous fall but by a protracted stagnation, frustration, fatigue, and—eventually—silent disappearance. One might even ask whether it is not blasphemy to talk about heroism in this regard, knowing that the advent of scientific planning was promoted by certain groups of the *nomenklatura*, and the program was contingent on daily collaboration between optimal planners and the party-state as well as on repeated concessions made by mathematical economists to official political economists. In the end, the optimal planners retreated from their research program in a despondent mood once central planning was abolished. Of course, both the strength and the duration of trust in making planning rational varied in the communist countries under scrutiny during those many decades. By and large, however, the 1950s and 1960s were a time of great hopes, the 1970s brought a stalemate, and the 1980s showed frustration and slow decline. In fact, rationality was not left behind by the optimal planners like a lost bag on a train but was abandoned as a hope.

The reader may have noticed that this narrative is quite pessimistic. In a twist on the title of Roy Weintraub's book (2002), prior to 1989, the official political economy of socialism "did *not* become a mathematical science" and, clearly, not a neoclassical one. Neither optimal planning and market reform nor any of their blends proved able to produce an original and robust theory of the planned economy or to force textbook political economy to become one. Intentionally or not, they delayed a profound scientific turn even on their deathbeds. Nevertheless, the main hero of our story mathematical planning did not bring its "gentle" characteristic traits that had informed

a few generations of scholars in the Soviet era about "divine" standards of economic research to the grave. In this respect, our narrative does follow the pattern of Greek tragedies.[16] To put it simply, optimal planning left several concepts of neoclassical economics and advanced mathematical methods of economic analysis to posterity. Whether or not the inherited standards were "divine enough" is just one from among a whole series of questions that our research group sought in vain to answer using the relevant historical literature. The state of the art conveyed far too rosy a picture in many fields, in which huge blank spots yearned to be filled with realistic colors.

Underestimating Failure, Ignoring Success: Some Words on the State of the Art

In identifying biases and blank spots, it is far from our intentions to brag about the wisdom of hindsight. Nonetheless, much of what our research group has explored in the history of planning concepts could have been mapped without difficulty three decades ago when the Soviet empire imploded or even earlier. Although a number of prominent mathematical economists (such as Igor Birman, Aron Katsenelinboigen, János Kornai, and Tiberiu Schatteles) had started complaining publicly about some unsurmountable scientific, technical, and political obstacles to their planning initiatives in the late 1960s and early 1970s, the second act of the play with its unhappy ending has not been written until now. In the concluding chapter of this volume I will offer a detailed survey of the relevant literature.[17] What comes next is just a foretaste.

The promising overture and quick exposition of the story of optimal planning was portrayed with great erudition and compassion by authors such as Michael Ellman, Pekka Sutela, and Alfred Zauberman, three of the most profound intellectual historians in the field. During the 1960s and 1970s, no eminent economic Sovietologists and experts of Comparative Economic Systems could afford the luxury of *not* expressing their opinion about what one of them called, sarcastically, "computopia." They did not share each and every optimistic goal set by the first cohort of mathematical planners but regarded the prospects for "contaminating" textbook political economy and improving the quality of central planning as realistic. Similarly, they did not mind if market reforms would be overshadowed by streamlining the planning regimes and some of them were definitely anxious about the neoclassical leanings of their Eastern European colleagues (China was under their radar at the time). Most of the first scholarly observers stressed the market (more exactly, *khozraschet*) orientation of the new research program and benevolently underestimated the statist preferences of the optimal planners.

Typically, these observers did not reach for the arguments of Ludwig Mises and Friedrich Hayek on the impossibility of rational economic calculation in

a "socialist commonwealth," which were put forward between the two wars. They instead accepted the position of Oskar Lange on fusing Marxian and Walrasian ideas. Preoccupied with the pragmatic question of which mathematical model would improve planning the most, they failed to tackle the core of the research program and ask whether any theoretically correct *and* practically feasible model could be built at all. The first analysts also were fairly uninterested in the sociological status of (and insensitive to the moral dilemmas experienced by) those local experts who decided to cooperate with the communist governments.

The Soviet story of optimal planning smothered the comparative history of the research program for too long; historians admired an unexpectedly successful scholarly advance and institutional buildup—all at the epicenter of an empire. Optimization efforts in the satellite countries were neglected, just like the delicate balance of conflict and cooperation between the mathematical planners and the market reformers, which often exerted a greater influence on the evolution of economic ideas outside the Soviet Union. Even such a conspicuous revolt against one's own research agenda like Kornai's bitter progress report about the failure of optimal planning in Hungary (1967) and his ensuing frontal attack on neoclassical economics (1971) did not prompt historians of economic thought to start writing the second act of our drama on stagnation and decline. Instead, the hype around Kantorovich's Nobel prize prolonged the victory lap of the research program while it was already well known that, despite the mushrooming of theoretical models of optimal planning, not a single communist country had ever executed a central plan even close to what mathematical planners proposed.

With time, the observers might have asked two questions:

1. Was the scientific core of the research program per se responsible for the fiasco or were the basic institutional arrangements of the planned economy operated by a communist party-state the main culprit, or both?
2. Was it worth looking for macroeconomic rationality in a centralized planning regime, in which the economic actors on each level of the hierarchy show little interest in contributing to (or are induced to work against) it when they want to attain their own (rational) goals?

Unsurprisingly, it was the heirs of the Austrian School of Economics (above all, Don Lavoie and Peter Boettke) who were among the first to ask such questions in the 1980s and 1990s. Without examining either the mathematical properties of the planning models or the political history of their reception and the sociology of the national research communities, they realized that optimal planning had entered a phase of decline. The "Austrians" contended with some satisfaction that—although the research program was

on its way to what Hayek called the "competitive solution" that makes some use of the market in generating realistic information—simulation would not bring economic advantages comparable to those of genuine capitalism. At the same time, they did not shed any tears for the superficial reception of neoclassical principles by the optimal planners because they had mixed feelings about those principles themselves.

Those who, in principle, could have combined the virtues of the above-mentioned interpretations (and avoid their vices) while capitalizing on first-hand local knowledge were those few historians of economic thought who lived in the communist countries. However, except for Andrei Belykh ([1989] 2007) and some recent writings, the reader will find only a few works containing personal reminiscences or detailed ego histories (e.g., Birman 2001; Fedorenko 1999; Kantorovich 2002; Katsenelinboigen 1980; 2009; Kornai 2007; Schatteles 2007) published by insiders to this date. The latter books did shed some light on the hidden motives of authorship as well as on interpersonal relations within the academia and politics but were not always unbiased, to say the least.

Following 1989, amidst a "neoclassical revolution" in post-communist economic sciences, optimal planning once again could have found itself a hero in a totally new context. However, its unintended achievements in paving the way for a reunification of Eastern and Western economic thought were seldom recognized either by insider or outsider observers. Instead, a small but vocal group of authors (including Johanna Bockman and Gil Eyal) with numerous followers in contemporary Eastern Europe contended that the infiltration of neo*classical* ideas into economic knowledge via optimal planning set the scene for a neo*liberal* hegemony in the region and beyond—another kind of reunification, a deplorable phenomenon in their view. This—heavily ideological—narrative was moderated by including in the historical analysis important factors from the sociology and politics of science (e.g., the role of the military, East-West dialogue, expert networks and power) and case studies from Eastern Europe based on interviews and archival materials. Yet, these historians could not write the second act on the fall of optimal planning for a simple reason: they were convinced that the decay already had begun during the first act when neoclassical theory's *Homo Oeconomicus* entered the stage and unleashed the doctrine of market socialism—allegedly—under the pretext of optimizing central planning.

Fortunately, this brief overview of the state of the art does not have to end on a sad note because reservations similar to those of our research group have been expressed by a number of (younger) scholars such as Ivan Boldyrev, Till Düppe, Yakov Feygin, Olessia Kirtchik, Adam Leeds, and Eglė Rindzevičiūtė who embarked upon writing case studies on the evolution of mathematical economics in the Soviet Union in the last few years.[18] They subject the

published texts to careful scrutiny and also immerse in archival and oral sources, showing a sometimes anthropological precision. These authors do not believe that the optimal planners were obsessed neoclassical theorists who "came out of the closet" as neoliberals during *perestroika*. They consider "coldwarism," that is, a special emphasis on geopolitical rivalry in general and on military demand for cybernetic development in particular, to be a key explanatory factor of the optimization of central planning. However, Eastern Europe and China hardly occur in their studies, and—with a few exceptions—the verbal reform economists and the official political economists of the USSR are only regarded as supporting actors on the stage of the evolution of economic ideas. Meanwhile, they provide an insightful typology of the mathematical planners.

The statist attitudes of the optimizers and their tight collaboration with the political elite do not prevent these historians from describing them as techno-scientists whose expertise slowly pulverized the communist regime from inside. Cybernetic utopias aside, they do not claim that the optimal planners made hopeless efforts to rationalize the communist economy. Due to a lack of "Austrian suspicion," the insistence by the Soviet planning experts on collectivist reasoning in economics goes unnoticed, suggesting that during the Brezhnev years of stagnation they insisted on the program of plan improvement for so long not because of the inertia of collectivist beliefs but of a persistent fear from repression. Finally, as regards the second act of our drama, one of the authors in this group coins the term "marcescence" but fails to link it, through a clear reference, to the impossibility of rational calculation under communism. Be as it may, the theme of optimal planning reemerged in serious historical studies; hence, the contributors to our volume did not have to start at square one.

On Methodology

Our doubts about the state of the art indicate the methodological backbone of our book. Like the previous volume on theories of ownership, we explored the evolution of planning concepts from five perspectives: chronological, thematic, qualitative, political/sociological, and methodological. In other words, the chapter authors did their best to walk the reader through the whole communist era of each selected country, map the key themes of the doctrines of central planning with a special emphasis on optimal planning, examine the scholarly quality and authenticity of discoveries[19] within this research program, check some of the political and sociocultural drivers of research, and raise a whole series of methodological issues that have been neglected by others.[20] These issues include the relationship between mathematization of planning and neoclassical economics in East-West comparison; the pattern

of evolution of economic ideas from the dawn to the twilight of optimal planning; as well as the pre-communist legacies and post-communist repercussions of mathematical economics. As icing on the cake, the multiplicity of research perspectives also should provide us with a "horizontal" view of intellectual history (e.g., transfer history and *histoire croisée*) and protect us from the fallacy of methodological nationalism even if eventually we ground our comparative conclusions on country studies. Here the contributors were interested in the role played by Soviet scholars in generating and transmitting economic knowledge in the framework of the research program in other countries of the Eastern Bloc and asked whether it makes sense to look for national types of optimal planning.

In striving to offer a Big Picture with ample historical and local detail, our latest volume devotes more room to discussing the work of leading scholars since in planning studies scientific findings were more significant than in research on ownership concepts. At the same time, similar to the first volume, we insist on the "importance of small texts," to twist Quentin Skinner's phrase, as the context of a few "great texts" emerging in the communist period. Understandably, the discursive aspects of economic knowledge are given special attention also because we want to comprehend the birth of a new vernacular in a Marxist-Leninist environment, namely, mathematical language. Finally, in the background of dominant planning concepts one usually finds influential institutions and personal networks. Therefore, our volume explores how, for example, the Planning Offices "thought" in the individual countries, or in what way optimal planners drew the contours of their professional identity and situated themselves in the rivalry between textbook political economists and market reformers.

Combining internalist and externalist techniques of historical analysis, our research group remained loyal to the principle of "healthy methodological eclecticism" presented in the first volume while continuing to refrain from an "anything goes" attitude (Kovács 2018, 13–16). We needed at least a modicum of flexibility to portray two main trends, the development of optimal planning and mathematical economics, which crossed each other: the former gave rise to the latter that, in the end, "thanklessly" survived its promoter. Flexibility did not mean that the contributors abstained from making clear judgements about the scholarly merits and political implications of the works discussed. What we abstained from was passing moral verdicts with a presentist pride. In an attempt to provide a sober contextual analysis, even those of us tried to remain as impartial and permissive as possible who—as active participants or eyewitnesses of the history of planning concepts depicted in this volume—had exhibited in the communist era a strong sympathy or aversion to certain ideas described in the pages that follow. That said, experiencing the attempts at improving the planning regimes from a close vicinity had

a notable advantage beyond any doubt. Those among us who took part in research and education of mathematical economics in our countries before 1989 can give a credible account of our own illiteracy in (and misreading of) then-standard neoclassical theory.[21] This fact was well known to Western observers, too, but—generously—they hid it under polite understatements.

The book the reader holds in hand is a result of the long-term research program *Between Bukharin and Balcerowicz. A Comparative History of Economic Thought under Communism* launched by the editor in 2014. In 2019, the program was transferred from the Vienna Institute for Human Sciences (IWM) to the Research Center for the History of Transformations (RECET) at the University of Vienna. The selection of countries, like many of the authors of the national chapters, remained the same as in the first volume. I am very grateful to my co-authors for their contributions to our research program. Unavoidably, both the fields and techniques of research overlap to some extent in our book series. Nevertheless, we radically deleted repetitions with a view of minimizing boredom and to encourage our future readers to browse through the volumes simultaneously.

NOTES

1. Our research program covers Bulgaria, China, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania, the Soviet Union, and Yugoslavia, that is, almost all ex-communist countries of Eastern Europe (in its Cold War sense), and China.

2. For more on the interpretation by our research group of economic collectivism under communism, see Kovács (2018, 1–22, 287–339).

3. Such designations invoke the memory of interwar development plans in Eastern Europe. As to the present, for example, the Orbán regime in Hungary calls itself the "System of National Cooperation" and launched a number of medium-term development plans during the past decade. Kaczyński's Poland introduced the "Plan for Responsible Development" in 2017 and complemented it with the program of the "New Polish Deal" in 2021. While some of the Eastern European governments are flirting with the idea of reintroducing strong state intervention under the auspices of such plans, China has not ceased to issue traditional five-year plans and longer-term development programs in the post-Mao era. In August 2021, the Chinese government accepted a five-year plan to strengthen macro-regulation. For more on the Hungarian case, see Kovács and Trencsényi (2019).

4. In this volume we use the language of the communist regimes without subscribing to the then-official meaning of the terms. In many respects, speech acts such as "mandatory central planning," the "Central Planner," the "law of planned and proportional development," and "socialist plannability" were empty shells in terms of economic reality and often referred to the opposite of their formal sense. Central planning

was neither central nor planning if one expected the term to mean a well-designed program of the organized management of the national economy from a single center, which—in contrast to capitalist spontaneity and anarchy—is based on rational principles (see notes 12 and 15) reflecting the collective wisdom of the party-state/working class/people, and so forth. It was evident that, for example, the phrase "Central Planner" denoted a layered, polycentric group of the *nomenklatura*, the "mandatory instructions" of which were shaped by a multilateral bargaining process including the addressees of these instructions. Moreover, planning was frequently culminating in administrative chaos, an extremely irrational selection of ends and means, enormous differences between the plans and the actual performance, and most surprisingly, it had an *ex post* rather than an *ex ante* nature due to its repeated revisions in the phase of implementation.

5. Besides the official jargon, the authors of the national chapters were free to apply phrases like "really-existing socialism," "Soviet-type socialism," or "state socialism" invoking illegitimate political discourse under the old regime. The widespread use of the term "communism" in the pages to come originates in the linguistic tradition of distinguishing "Western" and "Eastern" forms of socialism by calling the latter "communism" rather than in the absurd assumption that the Marxian vision of a communist society was fulfilled in any corner of the Soviet empire.

6. The term "classical system" was suggested by János Kornai (1992) in conjunction with Stalinist rule to distinguish it from the ensuing "reform system." Our previous volume and some of the national chapters of this one provide sufficient information about the deficiencies of this term. In short, these "systems" are not clearly demarcated ideal types but partly overlapping *quasi-ideal* types located between the genuine ideal types of a totally planned (centralized) in-kind economy based on party-state ownership and a totally unplanned (decentralized) market economy based on private property. The reform system does not follow the classical one but precedes it in many fields (see the NEP) while the latter was preceded by War Communism. Both are *real* types of Soviet economic history that from the end of the 1920s shows an oscillation between the two quasi-ideal types with a long-term tendency pointing toward the reform system in certain countries. Stalin's name can be linked to many phases of that oscillation in both directions: he was a cautious reformer on Nikolai Bukharin's side in the mid-1920s, a fanatic initiator of the classical system at the turn of the 1920s and 1930s, then he swung between these two roles during the 1930s and 1940s, approaching the reform system in the early 1950s again.

In the following, we will use the terms "reformer," "market reformer," "reform economist," "reform-minded economist," and "market socialist" interchangeably.

7. In the volume we will apply the conventional term of "central planning," keeping in mind that the other two adjectives (imperative and macroeconomic) are not to be ignored in a precise definition sensitive to historical change and suitable for East-West comparison. The imperative (mandatory, command-like, directive, direct) nature of central planning and the fact that it should embrace the national economy as a whole is essential in distinguishing it, on the one hand, from indicative planning under capitalism, and, on the other, from various forms of indirect macro-regulation

devoid of mandatory central instructions (targets) in certain segments of planned economies undergoing market reforms.

Taking a closer look, the adjective "central" and the noun "planning" also require clarification. To a degree, central planning always relied on decentralized procedures, and hierarchical coordination was mixed with multilateral bargaining in the entire communist epoch. In addition, planning combined economic control/regulation, extrapolation, and foresight in different proportions. Our main focus will be on macro-planning while enterprise-level planning will be examined only as far as it concerned economy-wide planning procedures. For recent broader overviews of planning theory in the East and the West, see, for example, Caldwell (2008), Döring-Manteuffel (2008), Laak (2008), Etzemüller (2009), Schulze Wessel and Brenner (2010), Matejka, Kott, and Christian (2018), Couperus, Grift, and Lagendijk (2015).

8. Both verbal and mathematical planning applied numbers and models. However, the former used formalized models rarely and these did not go beyond elementary statistics while the latter could not do without formal models and employed advanced mathematical instruments to follow (in most cases) the principle of optimization. Mathematical planners ridiculed the verbal specialists as bookkeepers with their simplistic balances. Yet, the scorn often did not pertain to the bureaucratic attitudes of the "accountants" or the roughness of their calculations but rather to the fact that this method of planning was considered to be much more exposed to arbitrary political intervention than the complex quantitative procedures.

Verbal political economy versus mathematical economics (see note 11) is also a helpful distinction to understand why and how official/textbook Marxism (more exactly, the varieties thereof) lost their monopoly. To be sure, mathematical economists did not apply their models exclusively to planning.

9. Below, the terms of "mathematical (scientific)" and "optimal" planning will be used interchangeably. The same applies to those of mathematical and optimal planner or, simply, optimizer. As it will transpire from the national chapters, the term "optimal planning" had a long and twisted prehistory until the use of mathematics in general and the concept of optimum in particular could overcome the hurdles set by communist ideologues in economic sciences. Despite its roots in Walrasian (neoclassical) theory of general equilibrium and many of its "Western" sources in the overlapping fields of input-output theory, operations research, activity analysis, and linear programming, optimal planning became an "Eastern" research program *tout court*, by and large consisting of input-output (I-O) and linear programming models that were not always fused tightly. Initially, the discipline was also called economic cybernetics, planometrics, and parametric planning. Over time, the models of optimal planning were refined considerably by including non-linear, dynamic, and stochastic methods. On the immense difficulties of making distinctions in symbolic geography between the East and the West with regard to this research program (cf. the role played by Wassily Leontief in its development), see the Conclusion.

Although there are strong arguments for using the Lakatosian term of "scientific research programme" to grasp the methodological status of optimal planning and think about its "progress" and/or "degeneration," the authors of the national chapters

were not strait-jacketed: they could call it a new paradigm, theory, concept, doctrine, discipline, and so on.

10. In this volume we focus on the communist world and regard the development of the research program on the other side of the Iron Curtain, say, from Paul Samuelson to Tjalling Koopmans and George Dantzig and further, as well known.

11. In the history of communist economic thought the idea of limited marketization was as old as Lenin's New Economic Policy from 1921 or even Marx's *Critique of the Gotha Programme* from 1875. It resurfaced among political economists time and again, especially if supported by authoritative works like Stalin's *Economic Problems of Socialism in the USSR* from 1951. However, the shattering of the illusion of optimizing the central plan was a necessary prerequisite for many economic theorists to turn from modest strategies of acknowledging the "commodity-money relationships" as auxiliary tools for improving planning to increasingly radical projects of market socialism in some countries. These projects transcended Oskar Lange's models from the 1930s in two respects: they replaced his basically mathematical approach with a verbal-institutionalist one, and extended his concept of simulated markets to real ones that also include the capital market.

12. The concept of rationality (see below) was linked to the auctioneer who in the role of the Central Planner distributes and redistributes resources to those determined by the optimal model to maximize collective utility (minimize waste) in reaching equilibrium while observing certain constraints. The auctioneer may borrow certain parameters of the model from market processes (this was already the case in the first Lange models in the 1930s) but does not give up his/her dominant position in resource allocation.

13. In the beginning, mathematical economists came from "bourgeois economics" of the interwar era (the pre-revolutionary era in the Soviet case), mathematics proper, and from Marxist-Leninist political economy, or were repressed market reformers. Many of them were self-taught mathematicians until courses in mathematical economics began to be accepted at the universities. Both "mathematical" and "economics" were thorns in the flesh of censors for a long time because these terms depoliticized official political economy as well as challenged its scientific (exact) nature, not to mention the fact that the "thought police" did not understand the language the mathematical economists spoke. Symbolic emancipation was slow: the adherents of the new discipline in the communist countries had to put up with designations such as "economy and mathematical methods," "mathematics of planning," "mathematics in economic research," and "economic analysis."

14. I discussed the quality of that breakthrough in Kovács (2002; 2012). Its level was deeply affected by the ambiguities of the reception of neoclassical ideas by the optimal planners.

15. For a similar approach to the concept of rationality, see Erickson et al. (2013). For differences between their and our assessment of Cold War's impact on the evolution of economic ideas in the Eastern Bloc, see the Conclusion.

16. The author of the Soviet chapter quotes Brodsky who said in another context that "in a real tragedy it is not the hero who perishes; it is the chorus." Or both, I

would add, as demonstrated by the fate of optimal planning in many communist countries. See the Conclusion.

17. See the proper references there.

18. Some of these experts contributed to our research program in its preparatory stage.

19. Here we pay attention to the sophistication of the research program as a whole rather than to that of its mathematical constituents. Similarly, for lack of space, the authors could not delve in the methodological details of mathematical modeling (cf. Morgan 2012).

20. Cf. the Introduction of our first volume (Kovács 2018).

21. See my "Everything I Always Wanted to Know about Mathematical Economics But Was Afraid to Ask" (Kovács 2016).

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