
BIG DATA, CAPITALISM AND SOCIALISM

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Abstract

The discussion of the merits of socialism, as opposed to capitalism's, is a topic that will not disappear, despite the abysmal failure of all 20th century experiences that called themselves socialist. This dispute is not purely ideological; on the contrary, it is clearly scientific up to a point. The contrasting conclusions of economists on capitalism vs. socialism depend first and foremost on the analytical framework they draw on to understand 'the economy' – hence on methodological positions that are sometimes held a priori. Since the 1920s, the Austrians have argued that an efficient socialism could not exist because of the impossibility of coordinating a complex economy without private property and market prices. According to Hayek, instead of given and objective, the knowledge required for an economy to work tolerably is dispersed and subjective, largely tacit, and indeed discovered in capitalism's competitive process. Yet several economists, mostly socialists, have recently argued that Hayek's diagnosis would now be outdated. The deployment of 'Big Data' and 'Data Analytics' would ensure economic efficiency. If this were true, markets would no longer have a reason to exist. However, the critical analysis undertaken in this dissertation demonstrates that 'digital socialism' (or at least one of the most relevant proposals in this field) fails to uphold the possibility of an efficient socialism.

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Resumo

A discussão sobre os méritos do socialismo, em comparação com o capitalismo, permanece viva apesar do completo fracasso de todas as experiências que se identificaram como socialistas no século 20. A disputa em causa não é puramente ideológica; até certo ponto é claramente uma disputa que pertence ao campo da ciência. As conclusões opostas de autores da Economia sobre capitalismo *versus* socialismo dependem em primeira linha do quadro analítico a que recorrem para compreender a economia, logo de posições metodológicas por vezes aceites *a priori*. Desde a década de 1920, os autores da Escola Austríaca argumentam que um socialismo eficiente não pode existir devido à impossibilidade de coordenar uma economia complexa sem propriedade privada e preços de mercado. Segundo Hayek, o conhecimento necessário para uma economia funcionar toleravelmente não é dado e objetivo; é disperso e subjetivo, em grande medida tácito e descoberto no decurso do processo concorrencial capitalista. Todavia, vários economistas, na maioria dos casos socialistas, argumentam que o diagnóstico de Hayek estaria desatualizado. ‘Big Data’ e ‘Data Analytics’ assegurariam a eficiência económica. Se assim fosse, a razão de ser do mercado desapareceria. No entanto, da análise crítica levada a cabo nesta dissertação resulta que o ‘socialismo digital’ (ou, pelo menos, uma das mais relevantes propostas nesta área) não consegue sustentar a possibilidade de um socialismo eficiente.

Table of contents

1. Introduction.....	1
2. The Socialist Calculation Debate Revisited	5
2.1. Mises' impossibility argument	5
2.2. Lange's 'Market Socialism'	6
2.3. Hayek's arguments	8
3. Socialism in the age of Big Data: Preliminaries	12
3.1. From the Socialist Calculation Debate to the age of Big Data.....	12
3.2. Morozov on Big Data: Criticisms	13
3.3. Morozov on Digital Socialism: Proposals	16
4. Saros' model of digital socialism	19
4.1. Introductory remarks.....	19
4.2. The model's building blocks.....	20
4.3. How socialism is to work.....	21
4.3.1. Registering needs: the 'mandatory registration period'	22
4.3.2. From needs to production: 'point allocation'; 'input acquisition' and 'production and transportation' periods.....	23
4.3.3. Distribution and consumption: the 'mandatory purchase period'.....	25
4.3.4. Labour management.....	26
4.3.5. Investment	27
5. Scrutinizing Saros' socialism	29
5.1. Introductory remarks and a first set of criticisms	29
5.2. Saros from the Austrian perspective	31
6. Conclusion	36
7. Bibliography	38

1. Introduction

In the latter part of the 20th century, the economic inefficiency of ‘real’ socialism was empirically apparent everywhere. In the long run, countries calling themselves socialist failed to produce standards of living remotely comparable to capitalism. In many cases, they produced catastrophic poverty and famine. Their governments seemed more concerned with military power than with minimum standards of economic welfare. Where reforms were implemented – a topic on which János Kornai is probably the authority (see Kornai, 1992) – they could not decisively correct the socialist systems’ severe shortcomings.

It is of the utmost relevance to note that serious socialists do recognize the failure of experiences such as the Soviet Union’s, accepting that this failure raises questions that need to be addressed. However, these socialists often contest that those experiences correspond to ‘true’ socialism. This is hardly controversial if one thinks of socialism as a *political* ideal. From this viewpoint, it is undisputable that the Soviet Union was not a socialist community, the lower stage of communism as conceptualized by Karl Marx in his *Critique of the Gotha Programme* (Marx, 1890-91). But it remains unclear what, from an *economic* viewpoint, ‘true’ socialism is supposed to be, and how its implementation could be successful in complex economies, with extensive division of labour. Do the *economics* of ‘true’ socialism also rest on Marx?

For Marx, as is well known, socialism directly opposes capitalism and entails the abolition of private property, markets and, of course, capital. Nor could it be otherwise, given the Marxian theory of exploitation, rooted in his labour theory of value. As Kornai (1992, p. 18) observes, Marx “invariably spoke very highly of the ability of capitalism to develop the forces of production” – as in the famous passage from the *Communist Manifesto* where he and Friedrich Engels tell us that “[t]he bourgeoisie, during its rule of scarce one hundred years, has created more massive and colossal productive forces than have all preceding generations together” (Marx & Engels, 1848, ch. 1).¹ On the other hand, Marx argues that the capitalist development of productive forces takes place in the context of exploitative relations of production, “amid the exploitation of the proletariat” (Kornai, 1992, p. 18).

¹ The reader will please note that no page numbers are indicated for quotations from a small number of works consulted in websites or, in one instance, in a Kindle edition.

Neither is there money in Marxian socialism. Marx writes that “[w]ith collective production, money capital is completely dispensed with”, adding that “[t]here is no reason why the producers should not receive paper tokens permitting them to withdraw an amount corresponding to their labour time from the social consumption stocks. But these tokens are not money; they do not circulate” (as quoted in Kornai, 1992, p. 475).

Marx explains his teleological conception very clearly in the famous Preface to *A Contribution to the Critique of Political Economy*. History has a purpose and “[t]he bourgeois mode of production is the last antagonistic form of the social process of production ... The prehistory of human society closes with this social formation” (Marx, 1859). Socialism (or, ultimately, communism) is meant to replace the ‘anarchy’ of markets by conscious planning, and capitalism’s allegedly exploitative nature by a community where humankind would flourish. That Marx envisages some form of planning is beyond doubt, but not much detail is provided in his writings.

In any case, as Kornai (1992, p. 475) remarks, “[o]ne of the axioms of Marxism must be abandoned by any who seek to combine what to Marx, Engels, and their truest followers were fire and water: socialism and the market.” As a matter of fact, however, ‘market socialist’ forms have been widely proposed since the late 1920s, making socialism a somewhat vague concept.

The recent surge of interest in socialism, at least in the sphere of academic discussion, is mainly due to the huge development in our capacity to handle and analyse very large data sets. As will become clear in due course, the core arguments against socialism (including its ‘market socialist’ variants), arguments which are due to Ludwig von Mises and Friedrich von Hayek, turn on the connection between the workings of markets and the availability of knowledge. As explained by Hayek (1945), instead of being given and objective, the knowledge required for a complex economy to work properly is subjective, dispersed in market participants’ minds, implicit in their everyday practices, and indeed discovered and revised in the competitive market process. But socialist economists – some inspired by success cases in the e-commerce retailing industry – argue that socialism could overcome the problems identified by Mises and Hayek; problems that, in fact, are not essentially computational, though the computational dimension was of course a relevant objection in the 1930s and 40s. If fuelled by Big Data and advanced computation, then, socialism could now be successfully implemented, as the whole economy could be efficiently planned. The

specific quantity of specific goods and services each person would like to consume at any given time could be known and provided.

To assess the validity of contemporary claims defending this kind of ‘digital socialism’ is the purpose of this dissertation. In an increasingly digitally driven economy, is it possible to replace the complex web of institutions, social relations and market transactions that structures market economies? The world has unquestionably changed beyond recognition in the 21st century. It is no longer physically contained. In the last decade, terms such as cryptocurrency, NFTs, machine learning, virtual and augmented reality, have become part of our everyday vocabulary, as transactions shift to digital channels. It is of the utmost economic importance to understand how such a shift impacts upon the way societies may efficiently organize themselves in the future. Significantly, economic literature on the possibilities of socialism in the age of Big Data, supercomputers and the like has been appearing. The *Journal of Economic Behavior & Organization* has recently had a call for papers on this topic.²

My argument in this dissertation is structured as follows:

In Section 2 I revisit the original Socialist Calculation Debate, the understanding of which remains indispensable for any serious analysis. I examine Mises’ seminal (1920) argument, a response to the orthodox Marxists’ astonishing lack of concern as to how a planned economy would work. Mises, as is well known, demolishes the notion of an economy without private property, markets or money and considers socialism ‘impossible’. I then move on to Oskar Lange, who accepts part of Mises’ reflections but responds with a neoclassical ‘market socialist’ proposal entirely alien to Marx. Lange’s (1936, 1937) argument was immediately considered successful, but that turns out to be a hasty judgment. Lange is not even sufficiently clear regarding the institutional design of his brand of socialism. Hayek (1940) perceived this flaw, and his arguments on the ontology of knowledge (Hayek, 1945) and the meaning of competition (Hayek, 1948) close this section. The upshot is that the Austrian arguments are correct, even though most economists in the 1940s and later – including staunch opponents of socialism like Joseph Schumpeter (see Schumpeter, 1942) – thought otherwise.

Section 3 is concerned with the possibilities of socialism in the age of Big Data, a scenario which Lange (1967) to some extent foresaw. In the light of the previous section, it is pointless to consider here writings which ignore the Austrian critique of planning or fail

² No articles have so far appeared in this journal’s website.

to argue why this critique would be wrong or outdated. Taking such writings as representative of the position I want to criticize would mean resorting to the strawman fallacy. There are competent authors whose confidence in the potential of the digital economy for the implementation of some sort of socialism coexists with an understanding of Austrian arguments. A remarkable example is Evgeny Morozov, and it is his position as expressed in Morozov (2019) – which revisits the Austrians as well as a wide range of authors with contrasting outlooks – that I examine in this section. I present some of his criticisms of overenthusiastic advocates of a digital post-capitalism and his own proposals as to what ‘the left’ (Morozov, 2019, pp. 53, 54, 67) should do.

Sections 4 and 5 are dedicated to explaining why, in my view, Morozov fails to establish the possibility of an efficient socialism. This involves a presentation of Saros (2014), the work on which Morozov mainly draws to argue that a convincing model of digital socialism is available (Section 4). This proposal is subsequently examined in some detail. In a nutshell, I show that the Hayekian arguments on knowledge and competition remain as valid as they were when he formulated them in the 1940s (Section 5).

Section 6 concludes my argument with a short summary and some observations on why socialism, even if its failure is established, will remain a living and, for many, compelling ideal.

2. The Socialist Calculation Debate Revisited

2.1. Mises' impossibility argument

The Socialist Calculation Debate, certainly one of the most important economic debates of the 20th or any other century, took place in the 1930s and 40s. But its opening shot was fired by Mises in his 1920 article on *Economic Calculation in the Socialist Commonwealth*. Originally written in German, the article stimulated a German debate (not discussed here) between Mises and the orthodox Marxists against whom his argument was framed.

When one recalls that the October Revolution took place in 1917, it is almost surreal how unconcerned Marxists were around 1920 about how an economy without private property, markets and money would function. With Lenin in power, 'War Communism' had been implemented, but with economic and social consequences so disastrous that before long (in 1921, after the Kronstadt rebellion and massacre) collectivism had to be reversed and some place for the market was reinstated.

Yet socialism did have considerable support in 1920. Mises' point is to establish that this support is based on a colossal misunderstanding, as a complex economy, based on a significant division of labour, is incompatible with socialism. It is in this sense that Mises considers socialism *impossible*.

The reason is easy to explain. Under socialism there can be no private property, and therefore no trading and no market prices, of higher order goods. In a market economy, it is the existence of these monetary prices, which reflect a multitude of subjective valuations, that enables agents to make reasonable choices about an infinity of possible courses of action. As Mises (1920, p. 101) puts it, "[monetary calculation] affords us a guide through the oppressive plenitude of economic potentialities". In the absence of prices so established for capital goods, socialist planners cannot have any clue as to what they should do. Any action they choose has no rational basis.

Let us to see this argument in more detail and in Mises' own words.

Under capitalism, market prices for higher order goods not only guide agents in their actions but allow them to revise their views as to what is their best course of action, guided by profit and loss. Mises is very clear about these two related functions. The objective exchange value, he writes,

“renders it possible to base the calculation upon the valuations of all participants in trade. The subjective use value of each is not immediately comparable as a purely individual phenomenon with the subjective use value of other men. It only becomes so in exchange value, which arises out of the interplay of the subjective valuations of all who take part in exchange ... But in that case calculation by exchange value furnishes a control over the appropriate employment of goods. Anyone who wishes to make calculations in regard to a complicated process of production will immediately notice whether he has worked more economically than others or not; if he finds, from reference to the exchange relations obtaining in the market, that he will not be able to produce profitably, this shows that others understand how to make a better use of the goods of higher order in question.” (Mises, 1920, p. 97)

Having identified the essential role of prices, Mises correctly concludes that socialism must be an economic impossibility, since prices of higher order goods - the result of the interplay of subjective preferences, *not* a set of random numbers – do not exist under socialism. Without them, socialist planners, whatever their intentions and aims, are unable to manage the use of scarce resources in a context of infinite possibilities. As Mises puts it,

“[a]s soon as one gives up the conception of a freely established monetary price for goods of a higher order, rational production becomes completely impossible. Every step that takes us away from private ownership of the means of production and from the use of money also takes us away from rational economics ... in a socialist state wherein the pursuit of economic calculation is impossible, there can be—in our sense of the term—no economy whatsoever.” (Mises, 1920, p. 104)

2.2. Lange’s ‘Market Socialism’

In the Socialist Calculation Debate of the 1930s and 40s, Lange, later a member of the State Council in Poland’s communist dictatorship, is generally considered the strongest opponent of Mises, even if his model of socialism was never implemented anywhere. His reply is a two-part paper entitled *On the Economic Theory of Socialism* (Lange, 1936, 1937).

Despite his belief that Mises’ claim regarding the impossibility of socialism is untenable, Lange does acknowledge that Mises is right in part. His argument made many

socialists realize that devising “an adequate system of economic accounting to guide the allocation of resources” *is* a real problem. Accordingly – but also provocatively – he proposes that “a statue of Professor Mises ought to occupy an honourable place in the great hall of the Ministry of Socialisation or of the Central Planning Board of the socialist state” (Lange, 1936, p. 53).

For Lange, Mises’ diagnosis of the impossibility of socialism is incorrect due to a misconception regarding prices. Lange claims it is necessary to distinguish *two* notions of prices: prices in the more common sense of the word – “the exchange ratio of two commodities on a market”, or Mises’ money prices; and prices in a generalised sense – the “terms on which alternatives are offered” (Lange, 1936, p. 54). Only the latter, Lange states, are required for a rational allocation of resources.

Lange goes on to claim that socialism *can* solve economic problems – problems of choice – in a rational way. To this end, the socialist planners would need three sets of data: 1) a scale of preferences to guide choices; 2) the aforementioned ‘terms on which alternatives are offered’; and 3) a list of all available resources in the economy. 1) and 3) would ‘obviously’ be available under socialism at least as they are under capitalism, whereas the ‘terms on which alternatives are offered’ would be “determined ultimately by the technical possibilities of transformation of one commodity into another, i.e. by the production functions” (Lange, 1936, p. 55).

In Lange’s model of socialism, the means of production – Mises’ higher order goods, except labour – would be publicly owned and controlled by the state through public companies. These firms would be ordered to behave as if they were operating in perfect competition. The production cycle would begin with the planning board making a list of capital goods and productive resources (except labour) and fixing a set of prices for them – strictly speaking, any set of prices. Firms would know the technology they ought to use and produce taking these prices as given. Consumers would choose what consumer goods to buy. The planning board would receive information on under- or overproduction (relative to demand) in the various stages of the process and revise the initially fixed prices accordingly. This trial-and-error process would continue until the economy reached an equilibrium. With this model, Lange claims, socialism could solve the calculation problem Mises had identified.

This would be achieved by simulating a competitive market and using accounting (rather than market) prices in the production process.³

2.3. Hayek's arguments

It was not long before Hayek, the most prominent Austrian economist jointly with Mises, produced various papers that eventually (but not in the 1940s) came to be recognized as a devastating critique of Lange.⁴ His central point is that the 'data' that Lange's relies on are not available for socialist planners to use. This sort of knowledge could never be 'given' to a central planning board because it is not just dispersed in agents' minds, partly tacit and often contradictory but *discovered* in the market process. That is, without markets, 'data' would not be accessible, not least because in part *they would not even exist*. But let me present Hayek's position in a more systematic fashion, drawing on his own words and dividing it into various interconnected arguments.

1. For Lange, as for his fellow socialists of the 1930s and 40s, economic problems are ultimately technical or engineering problems. But is the market really a computational device to achieve equilibrium via a trial-and-error process?⁵ Austrians cannot accept this point of view, which renders human action mechanical and leaves no space for imagination, learning, and evolution.

Even if we temporarily overlook this crucial problem, how exactly is Lange's trial-and-error to be implemented? How often, for example, would the planning board update prices? Every week or every minute? Lange's lack of concern with practical details precludes any answer to these questions, rendering the workings of his market socialism a mystery. In his 1940 response to Lange and other socialists, Hayek rightly insists on this point. "[C]omprehensive lists of prices of all means of production (except labor)" are supposed to be issued "from time to time", Hayek (1940, p. 134) remarks in his *Socialist Calculation: the Competitive 'Solution'*. And he adds:

³ There are, however, real markets for consumer goods and for labour services. Lange's argument draws on Taylor (1929), whose trial-and-error process he refers to. The details of the trial-and-error process are very sketchy indeed (for a detailed explanation of this, see Lourenço & Graça Moura, 2022, Section 2.3). The trial-and-error argument was widely considered a big step forward in comparison with models of socialism that required the explicit solving of simultaneous equations. But, as will be apparent, computational problems are not socialism's essential problem.

⁴ For a much later, short but very effective demolition of Lange by the octogenarian Hayek, where Lange's central arguments are called *Two Pages of Fiction*, see Hayek (1982B).

⁵ For a discussion of this topic, see Lourenço & Graça Moura (2022), especially Section 2.3.

“These prices would have to serve as the sole basis for all transactions between different enterprises and the whole calculation of all the industries and plants during the period of their validity, and the managers must treat these prices as constant. What we are not told, however ... is for what period these prices are to be fixed. This is one of the more serious obscurities ... which makes one almost doubt whether [Lange and Dickinson] have made a real effort to visualize their system at work. Are prices to be fixed for a definite period in advance, or are they to be changed whenever it seems desirable? ... Could the failure to understand the true function of the price mechanism, caused by the modern preoccupation with stationary equilibrium, be better illustrated? ... there are two points about which there can be little question: the changes will occur later than they would if prices were determined by the market parties, and there will be less differentiation between prices of commodities according to differences of quality and the circumstances of time and place.” (Hayek, 1940, pp. 134-135)

2. If all the needed data are ‘given’, implementing socialism is an ‘engineering problem’. Lange’s argument is, in this sense, a tautology – it assumes that market socialism can work because socialist planners have at their disposal everything they need to make it work. But they don’t. As Hayek puts it in *The Use of Knowledge in Society*, “If we possess all the relevant information, *if* we can start out from a given system of preferences, and *if* we command complete knowledge of available means, the problem which remains is purely one of logic.” (Hayek, 1945, p. 519). Market socialism, therefore, does not appropriately answer the question which economists need to answer: how a reasonable economic order can be achieved in the absence of supposed ‘data’ which can never be ‘given’. Indeed, for Hayek,

“[t]he peculiar character of the problem of a rational economic order is determined precisely by the fact that the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess.” (Hayek, 1945, p. 519).

Lange assumes, but does not establish, that communicating these (precarious) fragments of knowledge to a planning committee would not just be conceivable but could be more efficient than coordinating action through the market process. He does not see any knowledge problem. Hayek concludes:

“To assume all the knowledge to be given to a single mind in the same manner in which we assume it to be given to us as the explaining economists is to assume the problem away and to disregard everything that is important and significant in the real world ... there is something fundamentally wrong with an approach which habitually disregards ... the unavoidable imperfection of man’s knowledge and the consequent need for a process by which knowledge is constantly communicated and acquired. Any approach ... which in effect starts from the assumption that people’s *knowledge* corresponds with the objective *facts* of the situation, systematically leaves out what is our main task to explain” (Hayek, 1945, p. 530).

3. Hayek argues, then, that the data required for socialist planning to work would *cease to exist* under socialism, as knowledge emerges from a process of discovery driven by market competition and its supporting institutions. Lange fails to consider that competition “is by its nature a dynamic process whose essential characteristics are assumed away by the assumptions underlying static analysis” (Hayek, 1948, p. 94), that perfect competition means “the absence of all competitive activities” (Hayek, 1948, p. 96).

Lange’s proposal neglects that what constitutes, for example, a means of production cannot be a datum because the economic role of things is not independent of the social environment they are in and of agents’ perceptions and aims. As Lourenço & Graça Moura (2018) put it, drawing on Hayek:

“Why, for instance, is something a means of production? It is easy to see that no properties inherent to things – the properties of the stretch of space-time they occupy, which we may call intrinsic properties – are sufficient to determine their role. Few would affirm that an undiscovered oil reserve belongs to a community’s set of means of production. Before people learn of its existence, and perhaps go so far as

to decide that it is worth their while to do something about it, it should not be counted as a means of production.” (Lourenço & Graça Moura, 2018, p. 9)

Knowledge of what constitutes a means of production is thus impossible to centralize or contain in a list, as Lange uncritically assumes.

4. In a nutshell, for Austrians like Mises and Hayek, economic order cannot be attained without the market and its supporting institutions. Through the market process, agents communicate their preferences, learn about their surroundings, and revise their action. The dispersed, subjective and context-dependent nature of their knowledge does not allow it to be centralized, as Lange proposed. Markets, on the other hand, enable knowledge to be shared and renewed in a process of constant discovery. A spontaneous order thus emerges – a result of decentralized action rather than deliberate design. As Hayek writes in his landmark article on *The Use of Knowledge in Society*, quoting Alfred North Whitehead,

“[i]t is a profoundly erroneous truism, repeated by all copy-books and by eminent people when they are making speeches, that we should cultivate the habit of thinking what we are doing. The precise opposite is the case. Civilization advances by extending the number of important operations which we can perform without thinking about them.” (Hayek, 1945, p. 528)

3. Socialism in the age of Big Data: Preliminaries

3.1. From the Socialist Calculation Debate to the age of Big Data

It is apparent that the proposals of socialist economists in the vein of Lange do not build on Marx. Lange's trial-and-error adjustment mechanism - the quintessential element of his proposal - is a deliberate attempt to simulate the workings of a market, hence the term 'market socialism'. How, though, does Lange conceive the market? In sharp contrast to Mises or Hayek, Lange visualizes the market as a primitive computational device. This is particularly explicit in his last, posthumously published article, *The Computer and the Market*, where he writes that a market

“may be considered as a computer *sui generis* which serves to solve a system of simultaneous equations. It operates like an analogue machine: a servo-mechanism based on the feedback principle. The market may be considered as one of the oldest historical devices for solving simultaneous equations.” (Lange, 1967, p. 159).

It is striking to observe that, 25 years after Hayek's meticulous critique of market socialism, Lange still approaches the problem of economic order as if human action were mechanical. Anticipating many writers of our time, he shows that he never understood Hayek when he submits that his answer to Hayek would now be: “so what's the trouble? Let us put the simultaneous equations on an electronic computer and we shall obtain the answer in less than a second” (Lange, 1967, p. 158).

Two important implications for the remainder of our argument stand out from our overview of the Socialist Calculation Debate and Lange's posthumous paper.

First, it should be clear that socialist proposals that ignore Hayek's critique or do not take it seriously (and fail to falsify it) are quite fragile. Such proposals should not interest us here, to avoid the strawman fallacy. Discrediting them would not necessarily entail that socialism cannot plausibly work.

Second, regardless of what socialism precisely means, opinions about its viability as an alternative to capitalism appear to be related to technological developments. Since technological advances in computing are happening at a faster pace and on a greater scale than when Lange died, it seems likely that socialism will be an increasingly discussed topic.

There can be little doubt that we now live in a digital world that far surpasses what Lange might have envisioned. As Intel's co-founder Gordon E. Moore famously stated in the late 20th century, the number of transistors on computer microchips typically increases 100% every two years as computers' cost diminishes by 50%. This principle, which later became known as Moore's law, is based on the idea that smaller microchips can contain an increased number of transistors (electricity conductors which increase computational speed). Increased computational power also means increased ability to deal with larger amounts of information. This is what is typically referred to as 'Big Data': complex, gigantic, and often unstructured sets of data, from which data engineers now extract valuable insights on topics such as customer behaviour or product performance. And as the advent of the IoT (Internet of Things) takes place and more devices become connected to the web, the amount of new available data points is bound to increase inexorably.

Applications of Big Data technologies seem boundless. They span from advanced medical data analysis to 'smart city' tech deployment, to name a few. It is easy to see why such advanced data management technologies would spark the interest of planning advocates – especially those who, like Lange, view the implementation of socialism as an engineering problem. Fortunately, there are socialists interested in the world of Big Data who also take Hayek seriously. The most prominent case is probably Evgeny Morozov.

Morozov is a Belarusian researcher and public speaker, with a PhD from Harvard University in the History of Science. His work could be described as an in-depth analysis on the implications of living in an increasingly digital world. He writes in major media platforms such as *The New York Times*, *Financial Times*, or *The Economist*. That he is an outspoken advocate of socialism who understands Hayek is evident in his 2019 article on which I focus here, *Digital Socialism? The Calculation Debate in the Age of Big Data*.

A full analysis of the arguments contained in this article is beyond the scope of my argument. My aim in the next two sections is to outline (a) some of Morozov's insightful criticisms of what others have to say about Big Data and socialism; and (b) his proposals on the road to socialism.

3.2. Morozov on Big Data: Criticisms

Morozov's crucial critique is directed at those who "proceed to roll out the *deus ex machina* of information technology, Big Data, machine learning" and so on (Morozov, 2019,

p. 39), naïvely arguing that they will by themselves fundamentally change the constitutive characteristics of capitalism. His main target is Mayer-Schönberger's and Ramge's (2018) *Reinventing Capitalism in the Age of Big Data*, the extraordinarily ambitious original title of which, *Das Digital*, obviously rhymes with *Das Kapital*. These authors claim that the term 'capitalism' will become outdated and that "data will supplant the price system as the economy's chief organizing principle" (Morozov, 2019, p. 35).⁶

Morozov shows that this type of argument is indicative of a poor understanding of both Marx and Hayek. The fundamental aspects of capitalism are not altered by the process of digitalization. For Marx, the essence of capitalism is capital accumulation, which most certainly does not cease in the digital economy: "one would be hard-pressed to conclude that the proliferation of data-intensive digital commodities and services fundamentally alters the terms and dynamics of capital accumulation" (Morozov, 2019, p. 40).

But digitalization is equally insufficient to challenge the essentials of the Hayekian conception of capitalism. The belief that there is going to be no need to "compress a myriad of heterogeneous facts into the straitjacket of prices, when computer chips can communicate those facts directly" (Morozov, 2019, p. 36) reveals a lack of understanding of human action and competition in the Hayekian sense.

As we have seen, Hayek correctly identified the major flaw in Lange's market socialism: data is never automatically given, the main problem to solve is not a computational one (Morozov, 2019, p. 48). Put otherwise, Hayek views competition *as a process*: the price system is a dynamic mechanism the special quality of which lies in its ability to economize, to translate a complex world into an intelligible set of facts. In Morozov's words:

"[T]he price system works so well precisely because economic actors do not need to know much about the world to act effectively in it ... as long as one economic actor discovers a set of facts that changes their evaluation of a commodity, the effects of that revaluation propagate throughout the system—driving the commodity's price up or down—without anyone else needing to know what the new facts actually are." (Morozov, 2019, p. 45)

⁶ This belief is shared by many socialist authors as well, though Morozov pays less attention to them. See below.

This helps agents to make rational decisions. Moreover, much complexity is eliminated because the price system is embedded in a broader set of institutions, rules of conduct and norms (Morozov, 2019, p. 46). Individuals know what to do not just because there are market prices but because they can expect others to act in a certain way. In a nutshell, “[t]he price system can accomplish so much with so little precisely because economic actors do not need to reach for a manual or consult their therapist to know what to do when prices change” (Morozov, 2019, p.46).⁷

Morozov quotes Hayek’s (1948) argument that competition “is in large measure competition for reputation of goodwill”, “essentially a process of the formation of opinion”; and he adds: “If this sounds like the ‘data-rich’ dimension of markets ‘discovered’ by the authors of *Reinventing Capitalism*, it’s because it is” (Morozov, 2019, pp. 46-47).

Of course, the authors of *Reinventing Capitalism* are not the only ones to misread the digital economy. Socialists also err, believing that, ironically, capitalist technology has now solved their problem. Morozov acknowledges this:

“Recent counter-arguments from the left have generally involved pointing out that the most successful modern capitalist enterprises, from Amazon to Walmart, excel at planning; the advent of digital feedback will make such techniques even more widespread. If capitalists can plan, why can’t socialists?” (Morozov, 2019, p. 35)

An elaborate extension of this sort of reasoning is Phillips’ and Rozworski’s (2019) *The People’s Republic of Walmart: How the World’s Biggest Corporations are Laying the Foundation for Socialism*.⁸ The authors express their admiration for Walmart due to its “operational efficiency, its logistical genius, its architecture of agile economic planning” (Phillips and Rozworski, 2019). This said, they regard Walmart as an “execrable, sinister, low-down dirty villain of a company” (Phillips and Rozworski, 2019). This villainous entity interests them only in as much as it shows that is possible to plan efficiently. Walmart’s logistic success, though its “departments, stores, trucks and suppliers do not compete against each other in a

⁷ Morozov correctly concludes that a successful implementation of socialism must necessarily entail a significant change in the way agents perceive and act in the world: “When Austrian economists respond to today’s defenders of central planning by noting that any non-capitalist system – even one rooted in the power of Big Data – could only beat the efficiency of the price system if it also created new behavioural modes and frameworks of meaning, they have a point” (Morozov, 2019, p. 46).

⁸ The account and arguments below are my own, not Morozov’s (2019). He mentions but does not discuss Phillips and Rozworski (2019).

market” (Phillips and Rozworski, 2019), would render the Socialist Calculation Debate anachronistic. If the largest company in the world can coordinate its vast resources without prices, the authors argue, a large part of the world’s economy *is* a planned economy, without markets.⁹

Phillips’ and Rozworski’s (2019) line of thinking is fundamentally flawed, though.

First, they seem to misread partial empirical evidence. If Walmart can make use of huge amounts of data to efficiently manage vast resources, this obviously does not *per se* prove that a planning board could do so in a socialist regime. For that to be the case, it is insufficient to suggest that there *could* be a planning board with the same planning prowess as Walmart. Instead, it would be necessary to argue that in an economy without markets a planning agency would be similarly successful as a capitalist enterprise in the capitalist world.

In other words, Phillips and Rozworski (2019) implicitly reason as if the internal operations of large enterprises exist in an environment disconnected from market competition. Walmart’s logistical processes are thoroughly planned to be as efficient as possible, which is a direct reflection of the competitive stress the firm is continuously under. Why would a company make the effort to be more efficient under socialism, where it would face no competition? How could efficiency even be measured?

Second, it is noteworthy (and another indication of insufficient theoretical reflection) that Phillips and Rozworski (2019) assume, but do not show, that the giant-enterprise capitalism they focus on (subject to some sort of Schumpeterian competition, at least potential, as it no doubt is), *because it exists*, works better than a more competitive regime of smaller companies would.

3.3. Morozov on Digital Socialism: Proposals

Morozov does not just criticize. He believes digital socialism is not a utopia. What does a socialist expert on the digital economy who simultaneously understands Hayek propose?

⁸ In yet another twist, the authors praise Mises and Hayek. They write that Mises’ impossibility argument is “perhaps the strongest argument ever mounted against the idea of socialism”, and that Hayek’s conception of human action drawing on “incomplete, imperfect ideas about the world” rightly made him reject “mainstream fantasies” (Phillips and Rozworski, 2019). For them, “it was Lange who underestimated the problems he inherited from the economics of his time”. Despite their acknowledgement of Mises and Hayek’s points, they believe that “[t]he era of big data is proving Hayek wrong”: he “could not have envisioned the vast amounts of data that can be stored and manipulated outside of market interactions” (Phillips and Rozworski, 2019).

His key proposal turns on the concept of ‘feedback infrastructures’. Simplifying a little, feedback infrastructures are the means that enable their owners to extract valuable information from data. Morozov defines feedback infrastructure as “the ownership and operation of the means of producing ‘feedback data’”, which he considers to be “at least as important as the question of who owns the data itself” (Morozov, 2019, p. 52).

Morozov believes that the appropriation of feedback infrastructures by giant private companies does not necessarily benefit consumers. He focusses on Uber, “whose existence depends on the cross-pollination of numerous feedback mechanisms” (Morozov, 2019, p. 51).

Using a disruptive data-based approach, Uber drastically differentiated its services from traditional taxis, namely through dynamic pricing mechanisms. Taxi drivers had traditionally operated within a rigid fare model – which, Morozov remarks, was a legal imposition: “they were legally compelled to offer the same service, at the same rates, to everyone” (Morozov, 2019, p. 51). In contrast, Uber’s tech driven business model, fuelled by millions of data inputs, enabled the company to circumvent what turned out to be a competitive handicap for taxi drivers.

For Morozov, whatever efficiency gains may emerge out of Uber-like services is counterbalanced by the fact that they are achieved “at the cost of eliminating certain rights – and, along with them, an entire mode of thinking about social coordination in terms of solidarity-based institutions like the law” (Morozov, 2019, p. 51). The Uber phenomenon, for Morozov, is the image of a system that makes use of unclear ‘laws of capitalist competition’ at the expense of consumer rights.

Morozov’s thinking on feedback infrastructures is clearly expressed: the ability to extract information from, and act upon, data cannot remain a privilege of selected private companies. The political left (Morozov’s camp) must act to gain public control over those infrastructures. It must ‘democratize’ access to the information infrastructure (see Morozov, 2019, p. 65).

Apart from this general proposal, Morozov (2019, pp. 54ff.) presents ‘the left’ with four specific proposals to consider. However, the first of them, applied in China, is fortunately ruled out; the second, labelled ‘solidarity as a discovery procedure’ has apparently a limited scope, since it concerns “detecting new needs and ways to satisfy them through

non-market mechanisms” (Morozov, 2019, p. 54);¹⁰ and the third “concerns social coordination in matters unrelated to production and consumption” (Morozov, 2019, pp. 54-55).

So we are left with one specific proposal with a wide scope, labelled ‘automated planning’, which “focuses exclusively on coordination in the economic sphere” (Morozov, 2019, p. 55). This proposal is retrieved from a book by Daniel Saros, a radical economist, significantly titled *Information Technology and Socialist Construction* (2014).

We learn that Saros (2014) offers a (non-mathematical) model of “‘guild socialism’ in the era of Big Data” (Morozov, 2019, p. 63), “not a model based on ‘central planning’ in any formal definition of the term” (Morozov, 2019, p. 65). This model apparently fits Morozov’s quest to find an economic recipe based on the digital feedback infrastructure that is “decentralized, automated and apparatchik-free” (Morozov, 2019, p. 61).¹¹

The catch is that Morozov is somewhat selective regarding the information he chooses to convey about Saros’ model. One of the key elements of the latter, according to Morozov, is that *some* of the price system’s uses are kept, while *others* are replaced with the feedback infrastructure. We learn that there is “plenty of social coordination based on information, not prices”; and that, “wedded to a non-capitalist ethos”, the price system “plays no role in setting the level of compensation” (Morozov, 2019, p. 65). This is hardly sufficient to understand the model in detail.

In sum, we need to take a deep dive into Saros (2014), which happens from the next page.

¹⁰ No one ever denied that competition is not the sole discovery procedure. Considering alternative ways of discovery is not particularly interesting for our purposes, unless they have wide application - which is not the case here.

¹¹ There are some qualifications related to the dangers of bureaucracy, though (see Morozov, 2019, p. 65). They will become clear in the next section.

4. Saros' model of digital socialism

4.1. Introductory remarks

Saros' socialism is quite different from projects in the vein of Lange.¹² He is committed to "a new vision of socialism", since he acknowledges that "no proposed model has yet provided the fully functional and self-sustaining method of economic calculation that is required to make a socialist alternative successful" (Saros, 2014, p. 171).

His conception of the nature of socialism is thoroughly Marxian. Saros repeatedly invokes and endorses Marx's and Engels' reflections on the fundamental conditions of socialism: the logic of capital must be overcome, and production must serve social needs. Borrowing from arguments already found in the *Communist Manifesto*, Saros subscribes to the vision that "capital must be made impossible" (Saros, 2014, p. 172).

A socialism guided by the principles set down by Marx and Engels implies the abolition of commodities and of the market:

"Within the socialist mode of production, ... wealth consists of an immense collection of use-values. The key difference between the types of wealth found within the capitalist and socialist modes of production is that use-values within the socialist mode of production are not exchange values, and so they are not commodities. If use-values are not commodities, then that means that commodity exchange via the market does not exist." (Saros, 2014, p.173).

Despite his commitment to the orthodox Marxian vision, Saros recognizes its insufficiency regarding the conceptualization of socialism. For Saros, the question that socialists need to address is "whether conditions have changed since Marx's time such that a more complete conceptualization of a socialist society is now possible." (Saros, 2014, p. 2). Saros believes it is. He seeks to make the case "that humanity will soon acquire a new vision of socialism that abolishes capital in a manner that is most unexpected and truly revolutionary on a global scale" (Saros, 2014, p. 3).

Implementing socialism depends on the progress of 'social consciousness', though. Saros writes that

¹² For a partial qualification of this statement, referring to a special case considered by Lange, see Saros (2014, p. 215). Below I also argue that Saros' is a planning scheme that (like Lange's) is *partly* decentralized.

“[f]or commodity exchange via the market to have been abolished, most human beings must have achieved a very advanced level of social consciousness. That is, most human beings must have become highly conscious of the manner in which commodity exchange via the market gives rise to labor-power as a commodity and to capital as an independent social power.” (Saros, 2014, p. 173)

In other words, socialism – even if advanced computational power such as we now behold, which Marx and Engels could not have visualized, supposedly renders it a real possibility – will only be implemented when ‘most’ humans have become Marxists. An “extraordinary awakening” (Saros, 2014, p. 4) is required. “It is human nature that must change ... if the socialist mode of production is to be established” (Saros, 2014, p. 212).

Let us not dwell on this condition, though, and proceed to take a closer look at the *economics* of socialism according to Saros.

4.2. The model’s building blocks

In Saros’ model, the ‘socialist circulation process’ comprises *five recurrent phases* or periods. Chronologically arranged, they are the ‘mandatory registration period’; the ‘point allocation period’; the ‘input acquisition period’; the ‘production and transport period’; and the ‘mandatory purchase period’ (Saros, 2014, p. 177). The nature of these phases and their connections are inevitably opaque at this stage of my exposition but will become clear in the next subsection. For the time being, the reader is just asked to bear in mind that production, distribution, and consumption involve those five phases.

Underlying the socialist circulation process as Saros envisages it is a *key enabler*, a gigantic *digital infrastructure* with multiple functions. The identification of individual needs, as well as the selection of inputs to produce the requested goods and services, occurs through a digital platform with ‘complete’ information, which Saros calls the ‘General Catalog’ (Saros, 2014, p. 173). This platform is supposed to include *all* relevant information for *all* use-values that consumers may select to satisfy their needs, such as their physical characteristics, availability conditions and estimated prices; as well as a producers’ section with *complete* descriptions of *all* physical means of production (Saros, 2014, pp. 173-174, 186, 179). The digital infrastructure also performs the operations and calculations required for socialist production to be conceivable. In the realm of production, there are no prices. But the digital infrastructure guides production through a *point system*, which informs producers, at each

stage of the production process, of what quantities they are to produce of the various goods and services. The workings of this accounting system will be explained in the next subsection. Other functions of the digital platform will also become apparent.

The socialist economy as Saros imagines it comprises basically three institutions. These institutions are a set of *workers' councils*; the so-called *system administrators*; and a '*Council of Scientists*'. The two latter entities have some central planning functions while the workers' councils are charged with decentralized planning. Even 'automated planning', to use Morozov's (2019, p. 55) expression, is not entirely automated, and neither is it completely free from centralized forms of control. Let us have a brief look at each of these institutions.

Workers' councils are constituted at each workplace (or firm, if you will) and make and implement decisions regarding production (including transportation). In other words, they decide independently what and how to produce x (or y) with a given technology and a set of inputs, so as to "satisfy individual needs within the boundaries of environmentally sustainable resource consumption limits" (Saros, 2014, p. 184). A "democratically elected subcommittee of workers" (Saros, 2014, p. 177) determines internal council rules. Workers receive an income, as explained below, but firms make no profits.

System administrators ensure that the socialist system as a whole operates coherently, i.e., that activities are mutually consistent. This does not happen spontaneously in the setting that Saros proposes. The system administrators' main responsibility is to coordinate the length and timing of the so-called "point allocation time period", which must be the same for all workers' councils, so that an "optimal allocation of resources" is achieved (Saros, 2014, p. 178).

The 'Council of Scientists' is a workers' council of a special sort, whose members are "the world's most highly trained scientists" (Saros, 2014, p. 181). The Council's purpose is to ensure environmental sustainability, i.e., to determine limits to the use of natural resources so that future generations are shielded from environmental collapse. Accordingly, it has a sort of veto right.

4.3. How socialism is to work

To explain how socialism is supposed to work, I now consider the abovementioned phases or periods in some detail. The order in which I present them is determined by Saros' 'chronology' and by expository convenience. Unfortunately, Saros' text is not always

helpful. It is blemished by occasional lacunae. He is initially concerned with production, distribution, and consumption. Investment is discussed only afterwards.

4.3.1. Registering needs: the ‘mandatory registration period’

The *mandatory registration period* is the phase in which individual (consumer) needs are registered “using modern information technology” (Saros, 2014, p. 173). Individuals are assigned a specific number which identifies them, a number said to represent “the absolute uniqueness of each person” (Saros, 2014, p. 173). This number enables consumers to interact with the electronic infrastructure and communicate what use-values they wish to consume at certain future dates.

After logging into the system, individuals consult the General Catalogue, where, as remarked earlier, they can access all relevant information concerning all use-values that are supposed to be produced. Each person must identify his or her ‘needs profile’, which means selecting the use-values they wish to consume and ordering them by preference. A number is attributed by each person to each use-value in their needs profile, reflecting the ordering of use-values. Accordingly, information will be gathered by the system as to what each person wants to consume and what they consider more and less important.¹³ From those numbers, *admittedly arbitrary* (Saros, 2014, p. 174), a measure of the importance of each use-value for the whole community is obtained in the digital infrastructure. This measure will determine what is to be produced, as I will explain in due course.

There are no limits to the quantity of use-values that can be selected by each person from the General Catalogue. Nevertheless, individuals are rewarded if they end up purchasing the quantity of each use-value they registered. Saros writes that “the individual will receive a bonus that is positively related to the carefulness of his or her planning for the future” (Saros, 2014, p. 175). Individuals with smaller need profiles will likewise receive a bonus, as their behaviour “puts less strain on communally owned resources and contributes to less working time throughout society as a whole” (Saros, 2014, p. 176), which is the measure of progress. In short, individuals have incentives both to accurately plan and to limit their consumption of use-values.¹⁴

¹³ Individual needs profiles remain private, only the aggregate information is publicly available (Saros, 2014, p. 222).

¹⁴ Bonuses are paid in the form of credits that do not circulate: there is no money. Workers’ incomes are paid in the same form, as will be explained below.

4.3.2. From needs to production: ‘point allocation’; ‘input acquisition’ and ‘production and transportation’ periods

As Saros observes,

“The collection and communication of information about individual needs is important for the proper functioning of the socialist mode of production. This exercise is useless, however, without a method for producing use-values and a means for distributing credit income to those who wish to purchase them. In other words, the traditional economic question as to what must be produced has been answered, but the questions related to how it is to be produced and for whom it is to be produced are not yet fully answered.” (Saros, 2014, p. 176)

The model’s second phase, the *point allocation period*, consists of the use of *points* by workers’ councils to obtain the means of production they need to produce the required use-values (Saros, 2014, p. 177). Points are numbers that represent registered needs as described above. Each time an individual selects a certain use-value from the General Catalogue, the digital infrastructure registers points for that use-value. This process is repeated for all selected use-values in the General Catalogue, taking account of a) the number of times that each use-value was registered (more frequency leads to more points) and b) the order in which the use-value in question was registered (more relevance leads to more points). After the mandatory registration period, the electronic system will have determined how many points are associated with each use-value. Points are subsequently allocated to worker’s councils supposed to produce specific use-values.¹⁵ The length and timing of the point allocation period, which “is uniform across all socialist enterprises” (Saros, 2014, p. 178), is decided by the system administrators. Workers’ councils can only affect, to some degree, the duration of the other phases.

In short, points will allow each workers’ council to acquire such inputs as they require from other workers’ councils; which in turn will, jointly with labour, enable the production and transportation of the use-values that consumers have indicated they want to purchase.

¹⁵ Workers’ councils decide autonomously what use-values they produce and how these values are to be produced with the available resources. These use-values are then posted in the General Catalogue for consumers to be able to select them (Saros, 2014, pp. 176, 178). How many workers’ councils are to produce a given use-value is not specified.

The inputs that workers' councils require depend on production technology and the knowledge thereof. In Saros' model, knowledge of how much is required of any input to produce a specific use-value is *given*: "[e]ach workers' council has an ideal input mix in mind at a particular point in time" (Saros, 2014, p. 178). Workers' councils consult the '*producers' section*' of the General Catalogue to learn about the available productive resources. This part of the General Catalogue "contains all physical means of production with complete descriptions of their characteristics" (Saros, 2014, p. 178). After consulting this section, workers' councils register their input requirements in the digital platform.

Thus, knowledge of how goods and services ought to be produced, of what inputs are needed and in what quantity, is readily available to workers' councils. But there remains a problem: how the input requirement of workers' councils is to be fulfilled when the available quantity of a particular input is inferior to the overall quantity requested by workers' councils. "The troubling question that arises here," Saros writes, "is how this scarce input is to be allocated to the various workers' councils in the absence of commodity exchange and the price mechanism to clear the market of a shortage" (Saros, 2014, p. 179).

To circumvent this difficulty, Saros presents a simple formula for a *cooperative solution* supposed to demonstrate socialism's "rationality" (Saros, 2014, p. 179). When scarce resources cannot accommodate the requests of a certain input, each workers' council shall receive a fraction of the available amount of said input proportional to the percentage of points that each workers' council holds. This process happens "without any monetary exchange or barter exchange whatsoever. It reflects, plainly and simply, cooperation among bodies of working people." (Saros, 2014, p. 180).

As the process unfolds, given that part of their initial input requirements cannot be met, workers' councils must adjust their plans. The system iteratively recalibrates the allocation of each input and "groping towards a stable solution ... continues throughout the point allocation time period" (Saros, 2014, p. 180). At the end of this period, Saros submits, the quantity of each input to be delivered to each workers' council "will be entirely clear" (Saros, 2014, p. 180).

Point allocation occurs at various levels, given that the production process entails the production of intermediate goods as well as means of production before consumer goods

can be provided.¹⁶ Points are sent and received across the whole supply chain, from the final producer up to the first supplier. “The suppliers receive the sum total of points that have been ‘passed’ to them from the final producers. These suppliers then use those points to obtain available inputs and so on” (Saros, 2014, p. 180).

The third phase and fourth phases, the *input acquisition period* and, subsequently, the *production and transportation period*, eventually start. Inputs, including labour, are used to obtain the required use-values.¹⁷ All final use-values are transported to the retail outlets where they will be sold later. “As a result of the mandatory registration period, the point allocation period, and the input acquisition period,” Saros writes,

“by the time the production period begins, the socialist enterprise will possess as nearly as possible the physical inputs, the labor resources, and the output target to pursue the production of use-values to satisfy individual needs within the boundaries of environmentally sustainable resource consumption limits.” (Saros, 2014, p. 184)

4.3.3. Distribution and consumption: the ‘mandatory purchase period’

In the fifth phase, the *mandatory purchase period*, workers purchase use-values, whether or not they initially registered to do so. To acquire goods and services, they use *credit income*. The latter is electronically distributed to workers for completing their responsibilities and in this sense has some similarities with capitalism’s salaries. A workers’ council subcommittee, which “monitors the fulfilment of work responsibilities” (Saros, 2014, p. 185), assesses individual performance. Based on that assessment, it credits each worker with a daily amount. Workers with more experience or expertise receive higher amounts of credit. Workers with more demanding occupations are compensated. Saros writes that

“[a] given worker receives the same number of credits in a shorter amount of working time than another worker (who works for the same number of years without changing occupations and who performs at similar effort levels) if the work of the

¹⁶ As Saros (2014, pp. 178-179) notes, “[m]any input suppliers post the use-values they plan to produce in the General Catalog just as producers of final use-values have posted their particular use-values in the General Catalog.”

¹⁷ For reasons of expositional convenience, the way labour is handled in Saros’ socialism is explained below.

first worker is more tedious, difficult, dangerous, or unpleasant as indicated by the fact that less competition exists for such work.” (Saros, 2014, p. 185)

Apart from being used for purchasing goods and services at retail locations, whether they have been included in individuals’ needs profiles or not, credit income can be saved. In the former case, credits simply disappear and their ephemeral nature prevents inflationary tendencies; in the latter, they do not circulate. In Saros’ socialism, credits “are not used to purchase inputs as the revenues of capitalist firms are, and they do not contribute to enterprise profits, which is a category that simply does not exist.” (Saros, 2014, p.186).

For use-values to be acquired, they must have prices, which had not yet appeared in Saros’ model. Workers’ councils are supposed to form subcommittees with “the sole power to determine the prices of the use-values they produce” (Saros, 2014, p. 186). Their goal is “the complete sale of use-values” (Saros, 2014, p.186). Accordingly, prices may even be reduced to *zero*, if stocks persist. With this very limited role, it is clear that “[p]rices do not influence the distribution of credit income in any way” (Saros, 2014, p. 186).¹⁸

4.3.4. Labour management

The explanation of the basic mechanics of Saros’ brand of digital socialism would be incomplete without some comments, however succinct, on labour management and on investment.

Saros’ digital platform continuously tracks the professional record of every worker. Their *work profile* is an electronic record that “contains the worker’s entire work and education history” (Saros, 2014, p. 183). As in capitalism, workers are free to apply to any occupation of their liking; employment agencies are supposed to help workers find it. Applications are analysed by a special subcommittee in each workers’ council, which examines all candidates’ profiles and decides to grant them council membership or not. The subcommittee may also revoke memberships in overstaffed working functions. All these adjustments must be completed during the input acquisition period, so that production can take place in a stable environment.

¹⁸ There is just one additional purpose of prices. They may be included in the General Catalogue as ‘estimated prices’, and individuals will take them into account in constructing their needs profiles (Saros, 2014, p. 186).

Since labour is not coercively allocated, workers' councils must be able to attract workers, but this cannot be achieved by the means used under capitalism. Directly, workers' councils can, at most, "exert limited control over a workers' income by adding or subtracting a small percentage from each year, within global limits established by referendum" and dependent on an effort assessment (Saros, 2014, p. 185). The ability of workers' councils to attract labour rests mainly on their capacity to influence working hours: they can "reduce the working period as much as possible to attract new members and raise employment in this category. Hence, weekly, daily, and hourly pay will be increased indirectly" (Saros, 2014, p. 184).

The failure to guarantee the required amount of labour within a workers' council can be solved or mitigated in the following ways: where the workers' council is understaffed, workers are allowed to do multiple shifts (which will be attractive due to their higher hourly income), correcting the imbalance; where the workers' council is overstaffed, it will either a) revoke the membership of underperforming workers and/or, b) through a lottery system, revoke the membership of some performing workers.

Underlying the rules of labour management is the notion that the internal stability of workers' councils is desirable. It is noteworthy that workers are put at a disadvantage if they decide to change their occupation. Saros writes that

"[i]f a worker willingly decides to change occupations after many years, then the worker makes a decision that negatively affects the social product in a significant way. In that case, the worker returns to the base income, which is the same income that anyone just beginning in that position receives." (Saros, 2014, p. 185)

Saros' socialism, then, is designed in such a way that workers are progressively less likely to apply to change their occupation, since "[t]he longer the worker has worked in a given line of work, the greater is the loss of income that the worker experiences when he or she changes positions and returns to the base salary" (Saros, 2014, p. 185).

4.3.5. Investment

Investment decisions in Saros' socialism are made by workers' councils, which know in advance their "target production levels". Therefore, Saros argues, investment under the

socialist mode of production is “made on a more solid basis” than under capitalism (Saros, 2014, p. 193).

Investment occurs when workers’ councils have a surplus of inputs. The input acquisition period can be conceptualized as the merging of two subperiods: the first comprises the allocation of inputs “to satisfy present needs” (Saros, 2014, p. 195), as explained previously; the second comprises the allocation of surplus inputs “for the purpose of investment in future production ability” (Saros, 2014, p. 195). Workers’ councils may choose to ensure maintenance of installed production capacity, expand their productive facilities, or even “experiment with new production techniques” (Saros, 2014, p. 195). Though they are free to make their investment decisions, workers’ councils are expected to alter their product line or adopt a new production technique only “if sales or needs-based point allocations have been falling overtime” (Saros, 2014, p. 195).

Investment decisions are meant to be kept decentralized. As Saros puts it, “[i]n a socialist society... no central control of investment will exist with the exception of resource consumption limits in each geographic area as established by the Council of Scientists” (Saros, 2014, p. 195).

Conversely, the risk of failed investment projects is partly ‘socialized’ (Saros, 2014, p. 195). If an investment should fail to produce the desired outcome, the workers involved will not be directly affected since they do not own, or extract personal gain out of, means of production. Nor could it be otherwise in a socialist society such as Saros envisages. Saros writes, however, that failed investment decisions will not allow workers’ councils to produce as efficiently, which will render them unable to place use-values at a competitive price. Workers’ councils with less competitive pricing ability are likely to produce goods and services which are less sought out by individuals. Accordingly, point allocation will benefit efficient workers’ councils, making them contract more labour, whereas inefficient workers’ councils will employ fewer people.

It is important to highlight that individuals have a saying with respect to what use-values should be produced, as their choices from the General Catalogue communicate their preferences. The success of product innovation depends on their decisions. However, the listing of new use-values, as well as the choice of how they ought to be produced (process innovation), depend only on workers’ councils (Saros, 2014, p. 196).

5. Scrutinizing Saros' socialism

5.1. Introductory remarks and a first set of criticisms

As shown in Section 4, Saros' socialism is a digitally enabled planned economy. He proposes a sort of 'guild socialism', to use Morozov's (2019) expression, where firms, formed by workers' councils, act in a decentralized fashion. Nevertheless, some central planning functions remain, for which the system administrators and the Council of Scientists are responsible.

In this section I shall argue that Saros' proposal is very fragile: contrary to his claims, he fails to establish the rationality of a socialist economy. Essentially, my argument draws on the Austrian conception briefly presented in Section 2 of this dissertation.

But a broader set of criticisms can be levelled against Saros. His digital socialism project is unconvincing from a mainstream (or neoclassical) perspective, and it can even be criticized from a Marxian viewpoint. Some of his conceptions – for instance, of the nature of individuals – are perplexing from multiple viewpoints. Let me briefly consider some of these criticisms first.

Perhaps it should not be a surprise that Saros' model prescribes a recipe for economic order based on a questionable notion of the individual. It is difficult to imagine a plan that would coordinate an entire economy – a complex one, with extensive division of labour – without coercive force, and yet would simultaneously preserve the sovereignty of individuals. Nevertheless, Saros explicitly claims that his proposal "acknowledges the value and uniqueness of each and every individual person" (Saros, 2014, p. 173). But this beggars belief. In the context where this sentence comes from, individuality means having an *identifying number*, said to "emphasize the absolute uniqueness of each person in terms of the past, present, and future" (Saros, 2014, p. 173), to select items from an interminable list. And, elsewhere, there are signs that individuals do not matter that much.¹⁹

Consider Saros' limited concern with individual fulfilment, which is quite apparent in the employment guidelines of workers' councils. A worker's decision to change occupations is regarded as an anti-social choice, a choice which "negatively affects the social

¹⁹ However, Saros states at a later stage that the use of individual needs profiles indicates that he "takes seriously the Austrian conception of an individual as a person who acquires information, makes decisions, engages in purposive action, and communicates new information to others on the basis of what has been learned." (Saros, 2014, p. 220). As will be seen below, this is an astonishing claim.

product” (Saros, 2014, p. 185). Enabling individuals to freely apply for jobs while drastically diminishing their income if they change occupations is, of course, at odds with the claim that everyone’s ‘uniqueness’ should be taken into account. It would seem that Saros does not seriously value the role of work in personal fulfilment. Nor is this altogether surprising, given his endorsement of the view “that the true measure of progress over time is that we all work less” (Saros, 2014, p. 176). That social plans ought to be privileged at the expense of individual goals, notably regarding work, is presumably what he means when he requires that individuals possess an advanced social consciousness.

Saros’ ‘Council of Scientists’ is another odd contraption. We are supposed to believe that a group of scientists – the best, most highly trained ones – are recruited to ensure that production is compatible with environmental sustainability. In other words, a set of superior minds will, somehow, rationally decide on (or manage) the whole pool of natural resources. This must seem implausible to most people, regardless of whether they are vaguely familiar with the Austrian ontology of knowledge. Even if the concept of a council with those functions were accepted, it is unclear how the ‘best’ scientists – who, presumably, would not be entitled to change occupation, given the priority of the ‘social interest’ over individual fulfilment in one’s work – could be objectively selected. What does it mean to be one of the most highly trained scientists? Saros does not elaborate.

From a mainstream or neoclassical viewpoint, Saros is not compelling for various reasons. For instance, numbers are assigned to individuals’ preferences, based on which the system generates ‘points’ that guide the production of use-values, as previously explained. These numbers are recognized as arbitrary (Saros, 2014, p. 174), which is said not to matter. But doesn’t it? Saros (2014, p. 204) denies that interpersonal comparisons of utility are made, but is that true? Saros is similarly vague regarding many production-related issues. For example, is a specific use-value produced by a workers’ council or by many? He has nothing to say on increasing returns to scale. These and other lacunae collide with his claim that an optimal allocation of resources will be achieved in his brand of socialism, though perhaps that claim should not be interpreted literally.²⁰

²⁰ Many other criticisms could be considered at this juncture, but they relate to topics not discussed in Section 4, which contains just the basics of Saros’ model. His own exposition is much larger but often cryptic or superficial. Scattered comments apart, he treats issues such as savings, externalities, medical care, or road construction and transportation (see Saros, 2014, pp. 196, 208-209, 210-211, 218) in a paragraph or two.

It is also interesting that Saros, a vocal Marxist who continually pays his respects to Marx and Engels, treats *individual preferences* and *needs* as interchangeable.²¹ Making a set of choices in the General Catalogue means identifying a set of individual needs. Some Marxists would probably dissent, considering instead that needs are (ontologically) determined by human nature, one of the market system's problems being precisely that it responds to manipulated preferences rather than real human needs. It seems likely that Saros' position stems from the belief that false consciousness will disappear when everyone has finally embraced Marx's teaching.²²

I could go on; but let us shift to an Austrian critique of Saros instead.

5.2. Saros from the Austrian perspective

My main points against Saros' proposal rest on the Austrian arguments produced in the 20th century and outlined in Section 2.

I will show that Saros' view that the "economic communication of human needs" – the key enabler of his brand of socialism – is "made possible as a result of our recently developed information technology" (Saros, 2014, p. 5) is fallacious. This misconception follows from Saros' implicit ontological presuppositions – or from his insufficient attention to ontological reflection, a common but usually fatal error (see, e.g., Lawson, 1997, 2015).

Saros seems to conceive knowledge of the economic realm as purely objective. This vision creates the illusion that socialism is possible thanks to powerful data management systems and that market prices are unnecessary. If knowledge were as Saros conceives it, the development of information technology might render a socialist mode of production feasible. However, as Mises and Hayek demonstrated decades ago, knowledge is not a set of 'given data'. It is largely subjective, dispersed in individuals' minds, fragmentary, partly tacit, often composed of contradictory 'guesses' which are confirmed or revised or discovered through the market process. Market prices are both inputs and outputs in this process, in which both consumers and producers learn, and a tolerable degree of economic rationality and order obtains.

From the outset, the mandatory registration period exemplifies Saros' treatment of knowledge. Underpinning the choice of use-values in the General Catalogue is the notion

²¹ On this point, I actually agree with Saros.

²² Morozov (2019, p. 64) remarks that Saros' proposal is also at odds with "the eco-socialist creed".

that individuals *explicitly know and consciously identify* their future consumption needs after perusing a gargantuan list of all available use-values. This is difficult to take seriously. Workers' councils could perhaps drastically reduce the variety of use-values they place in the catalogue. But what would this say about the purportedly unique value of each person under socialism?

One might think that technological advancements would help here. Machine learning algorithms, used by capitalist companies to identify their customers' purchasing patterns, could be used to facilitate the communication of needs in Saros' socialism. This is basically Morozov's (2019) belief. Such algorithms would anticipate what each person might want from the General Catalogue, providing individuals with a list of use-values that would take account of each person's profile, consumption history, and so on.

But is this realistic? Fernández-Villaverde (2021) explains some of the shortcomings of machine learning. Instead of "meaningful causal relationships", machine learning looks for correlations. Operating "without a theory of the decision-making that underlies ... behavior", it cannot identify real consumer preferences.

Once individuals communicate their needs through the information system, the production cycle is set in motion. Production supposes the availability of means of production for workers' councils and knowledge of the appropriate production techniques. The General Catalogue is again the crucial piece at this stage. As explained in Section 4, in its producers' section, it lists "all physical means of production with complete description of their characteristics" (Saros, 2014, p. 178). With this information available, workers' councils are supposed to register their needs. Therefore, production techniques are also assumed to be known to workers' councils.

But can computational prowess ensure a rational use of means of production? A list of all available physical means of production implies, of course, that we *know*, a priori, what *constitutes* a physical means of production, as if that were determined by some objective, intrinsic properties. But, as Hayek argues, the facts with which economics is concerned "depend on the subjectivity of agents, on their *attitudes*: on what they believe and desire, which in turn explains what they do" (Lourenço & Graça Moura, 2018, p. 9). Recall the example of an undiscovered oil reserve mentioned in Chapter 2. It cannot be considered a physical means of production before some people find it and regard it as profitable to explore it.

In other words, the economic role of things is contextual and needs to be discovered; market competition is a *discovery procedure* (Hayek, 1978). As Lourenço & Graça Moura (2018, p. 2) argue, “[t]he competitive market process leads to reasonably efficient outcomes precisely because it integrates a vast amount of dispersed, often tacit knowledge and continually renews the structure of knowledge that makes a complex economy work.”

So Saros’ belief that physical means of production can be treated as data cannot be upheld. What is curious is that he thinks he has taken account of Hayek. For the latter, Saros writes,

“for economic knowledge to be useful, it must be highly specific and acquired through direct contact with the use-value in question ... The General Catalog in a socialist society must contain this level of detail so that needs may be registered and orders may be placed for highly specific use-values that are distinguished according to any relevant characteristics, including such factors as age and location. Because those workers who have direct contact with the use-values make this information available online, it is as accurate and reliable as any information acquired and communicated via the market process.” (Saros, 2014, p. 219-220)

Are we supposed to believe that, once information that contains subjective and contextual judgements has been uploaded, it becomes objective knowledge?

Essentially the same criticisms apply to the belief that workers’ councils know how to produce efficiently in the absence of the market mechanism. Efficient (or more efficient) production techniques are not data but knowledge acquired or discovered when competing in the market.²³ It is unclear how, under socialism as Saros conceives it, inefficient or erroneous decisions would be identified and corrected. The absence of the competitive market process does not allow workers’ councils to discover how efficient they are, or how they could do better.

How are workers’ councils supposed to choose, or to change, their production technique? According to Saros, workers’ councils change their production technique if they

²³ This is why what is produced in a market economy “will be produced by people who can do so more cheaply than (or at least as cheaply as) anybody who does not produce it (and cannot devote his energies to produce something else comparatively even more cheaply), and ... each product is sold at a price lower than that at which anybody who in fact does not produce it could supply it” (Hayek, 1978, p. 185).

observe that “sales or needs-based point allocations have been falling over time” (Saros, 2014, p. 216). However, basing production decisions on the information that flows through the point allocation system is problematic.

Take a specific, highly demanded product – say, paracetamol. Paracetamol would be part of millions of needs profiles in the General Catalogue, and a large number of points would certainly be assigned to the workers’ councils that produce it. But high demand is not related to efficiency, i.e., to the right production techniques being used.

There is a key difference in comparison with the competitive market system. In the latter, demand for paracetamol would also be high, but firms would have the incentive, indeed they would probably need, to discover how to do better and to improve their performance. Under socialism, where the market process has been suppressed, workers’ councils have no incentive to do better. And the prices for which use-values are sold in the mandatory purchase period are useless to guide production: they do not reflect the relative efficiency of workers’ councils. Nor is it clear why estimated prices would provide reliable information in this respect. Without market prices, workers’ councils could be tied up to inefficient production techniques indefinitely. As Hayek reminds us,

“[i]f we do not know the facts we hope to discover by means of competition, we can never ascertain how effective it has been in discovering those facts that might be discovered. All we can hope to find out is that, on the whole, societies which rely for this purpose on competition have achieved their aims more successfully than others. This is a conclusion which the history of civilisation seems eminently to have confirmed.” (Hayek, 1978, p. 180)

The absence of market competition undermines the incentive to be innovative. But the innovation performance that one may expect in Saros’ socialism is apparent from his guidelines on investment. Investment should take place if workers’ councils have input surpluses once production is completed (Saros, 2014, pp. 194-195); workers’ councils are expected to privilege maintenance and replacement, and afterwards consider whether to expand production or change products or production techniques.

Could workers’ councils operating in this way match capitalist entrepreneurs in responding to consumer needs? Under capitalism, as in Saros’ socialism, consumers do not choose *ex ante* what goods are to be produced. In a competitive environment, however,

successful firms must take risks and come up with new products and services that consumers *find out* they want. Steve Jobs, Apple's co-founder and one of the most remarkable entrepreneurs of the last 50 years, famously stated, borrowing from another great entrepreneur:

“Some people say, ‘Give the customers what they want.’ But that’s not my approach. Our job is to figure out what they’re going to want before they do. I think Henry Ford once said, ‘If I’d asked customers what they wanted, they would have told me, ‘A faster horse!’” People don’t know what they want until you show it to them. That’s why I never rely on market research. Our task is to read things that are not yet on the page.” (Goodreads, n.d.)

Why should workers’ councils follow these guidelines?

As I see it, in sum, Saros’ proposal does not survive Austrian criticisms, primarily because he does not take the nature of knowledge and the role of the market process seriously enough. Despite his proclamations, Mises and Hayek are not yet outdated; conversely, Marx and Engels *are*, at least on these topics.

In the unlikely event that Saros were to concede that I have a point, he might protest that arguments like mine would not hold once individuals understand the oppressive nature of capital and embrace the socialist ideal. But tautologies are, by definition, not very interesting. In that scenario, by the way, the term ‘individual’ would have quite a different meaning. The role of economists is not to explain how the economy would work if the nature of individuals were not what it is; it is to explain how the spontaneous interaction of actual individuals under a certain set of institutions and rules produces a tolerable degree of order, as it does in a capitalist setting.

6. Conclusion

The insights that underpin my argument in this dissertation ultimately go back to Adam Smith. Why should we, in the age of Big Data, read 18th century writings? For passages such as this one, from *The Theory of Moral Sentiments*:

“The man of system ... is often so enamoured with the supposed beauty of his own ideal plan of government, that he cannot suffer the smallest deviation from any part of it ... He seems to imagine that he can arrange the different members of a great society with as much ease as the hand arranges the different pieces upon a chess-board. He does not consider that the pieces upon the chess-board have no other principle of motion besides that which the hand impresses upon them; but that, in the great chess-board of human society, every single piece has a principle of motion of its own, altogether different from that which the legislature might chuse to impress upon it.” (Smith, 1759, pp. 233-234)

Or this one, from the *Wealth of Nations*:

“What is the species of domestick industry which his capital can employ, and of which the produce is likely to be of the greatest value, every individual, it is evident, can, in his local situation, judge much better than any statesman or lawgiver can do for him. The statesman, who should attempt to direct private people in what manner they ought to employ their capitals, would not only load himself with a most unnecessary attention, but assume an authority ... which would nowhere be so dangerous as in the hands of a man who had folly and presumption enough to fancy himself fit to exercise it.” (Smith, 1776, p. 456)

Despite all the differences on, say, the theory of value, there is a clear line, so my teacher Mário Graça Moura tells his History of Economic Thought students, that connects passages such as these and the Austrian contributions to the Socialist Calculation Debate.

Inspired by Carl Menger, the Austrians are committed to subjectivism – to the notion that we must think how actions are guided by the ways agents view things. Therefore, the Austrians take knowledge seriously – who knows what and when, how dispersed, often tacit, subjective information is discovered, used, disseminated and corrected, these are questions

crucial to understanding real-life economic problems. And, thanks to their contributions to the ontology of knowledge, the Austrians have identified the nature and the indispensable role of the market – that it is a process of discovery and revision of knowledge that otherwise we could not even know (and, as Hayek (e.g., 1982A) often reminds us, a spontaneous order).

All the Austrian arguments in the original Socialist Calculation Debate are linked to these principles, which Mises, Hayek, or both, formulated or developed during or after the debate. To ignore these principles amounts to giving up understanding the nature of a market economy and can hardly be taken seriously over a century after Mises' 1920 article.

The digital economy has stimulated many new versions of socialism, some of them claiming to draw on Marx's and Engels' special authority. Of the articles on 'digital socialism' available, I have focussed on Morozov (2019) in this dissertation, because there is no doubt that he understands Hayek. Oddly, he ends up endorsing the form of 'automated planning' put forward in Saros (2014) – a proposal that, as I have endeavoured to show, does not survive Austrian criticisms. Its understanding of markets is as flawed as Marx's or Engels', from whom Saros (2014) repeatedly borrows, adapting their thinking to the digital age whenever possible. If digital socialism is this, it is stillborn.

One thing is certain: interest in socialism will not disappear, even if the proposals I consider here, or others, are unworkable. For, as Schumpeter (1942) explains, socialism is a product of the capitalist process and its 'rationalization' of the mind (see Graça Moura, 2018, pp. 125-126). Capitalism will go on producing socialists and their supposedly salvific proposals as surely and efficiently as it produces the technology that most of those socialists will want to rely on.

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