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Rationality and Distribution in the Socialist Economy

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*Submitted in fulfilment of the requirements for the Degree of
Doctor of Philosophy*

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Abstract

The thesis provides a philosophically grounded account of a socialist planned economy. While I do not primarily consider a positive case for socialism, I address two major objections to it and thus argue that the possibility of socialism as an alternative form of economic organisation has been dismissed too quickly. Furthermore, I provide an account of the precise form a socialist economy should take, outlining general principles of planning and distribution.

Based on a welfarist interpretation of Marx, I show that distribution of consumer goods should be facilitated by an equal distribution of tokens. These tokens can be redeemed for consumer products or substituted for additional leisure time. The rates at which tokens can be redeemed for consumer products should correspond to market clearing prices. Welfare-oriented socialism is also defended against a deontological objection to socialism by Robert Nozick, who claims that socialism leads to injustice because it violates private property rights.

The thesis also considers Ludwig von Mises's calculation argument against socialism, which claims that socialism leads to the abolition of economic rationality. I show how this objection can be overcome by using optimal planning techniques which are responsive to consumer demand as signalled by the market clearing rates of consumer products. The resulting model of socialism is tested using a computer simulation. The simulation also demonstrates that a novel system of valuation based on opportunity cost leads to a better adaptation of production in response to environmental constraints when compared to the labour values of classical political economy.

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List of accompanying material

Python code for OCV simulation (see Section 7.3) "Simulation2.py"

Python code for consumer model definitions (see Section 7.3) "Def.py"

Python code for labour value simulation (see Section 7.3) "labourValueSim.py"

Python code for complexity test (see Section 7.5.2.2) "complexity.py"

Preface

Some of the content of this thesis has been published. An article in *Mythos Magazin* (Dapprich, J.P. and Körner, P. 2017, *Utopien: Ideologie oder Wissenschaft?*, *Mythos Magazin*) is in part based on a German translation of an early draft of Chapter 2. A book chapter (Dapprich, J.P. 2018, *Cybersozialismus als konkrete Utopie*, in Neupert-Doppler, A. [ed.] *Konkrete Utopien*, Schmetterling Verlag) is not based on any particular chapter but includes some of the research findings presented here. Various blogposts for www.designing-history.world describe the computer simulation presented in Chapter 7.

Some quotations from online sources, such as the Marxist Internet Archive, or e-books do not include a reference to the page number, since page numbers do not exist for these. Instead, I have provided the corresponding part, chapter or section number or title. Quotations from German sources have been translated by me.

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Special thanks goes to my middle school philosophy teacher who strengthened my resolve to pursue a PhD in philosophy by telling me that I have no talent for the subject.

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Author's declaration

I confirm that this thesis is my own work and that I have: (i) read and understood the University of Glasgow Statement on Plagiarism, (ii) clearly referenced, in both text and the bibliography or references, all sources used in the work; (iii) fully referenced (including page numbers) and used inverted commas for all text quoted from books, journals, web, etc.; (iv) provided the sources for all tables, figures, data, etc. that are not my own work; (v) not made use of the works of any other student(s) past or present without acknowledgement. This includes any of my own works, that has been previously, or concurrently, submitted for assessment, either at this or any other educational institution; (vi) not sought or used the services of any professional agencies to produce this work; (vii) in addition, I understand that any false claim in respect of this work will result in disciplinary action in accordance with University regulations. I declare I am aware of and understand the University's policy on plagiarism and I certify that this thesis is my own work, except where indicated by referencing, and that I followed the good academic practices noted above.

Chapter 1

Introduction

The aim of this thesis is to provide a philosophically grounded account of a socialist planned economy. While I will not primarily consider a positive case for socialism, I will address two major objections to it and thus argue that the possibility of socialism as an alternative form of economic organisation has been dismissed too quickly. Furthermore, I will provide an account of the precise form a socialist economy should take, outlining general principles of planning and distribution.

The market as the predominant form of economic organisation has been a significant object of discussion and contention in western political philosophy ([Herzog 2017](#)). In the early Enlightenment, thinkers like [Mandeville \(1924\)](#) and [Rousseau \(1754\)](#) took up opposing views on the upcoming commercial society of their time. Marxists ([Marx 2008](#), 192-330; [Cohen 2014](#)) criticise the exploitation they associate with capitalist market economies, while a variety of defences of the market have been offered (e.g. [Nozick 1974](#), [von Mises 1920](#), [Hayek 1945](#), [Friedman & Friedman 1962](#)).

However, discussions of the market have not been limited to taking position for or against the market. Critical friends of the market ([Herzog 2017](#), Section 2) acknowledge problems with market economies and discuss the extent to which other social institutions should interact with the market to counteract these problems. Discussion of market societies has thus not been limited to whether they are good or bad, but specific issues of justice within such market societies have received significant attention (e.g. [Rawls 2001](#), [Dworkin 2002](#)).

In comparison, the philosophical literature dealing with socialist economic planning as an alternative to the market is not as rich and has not received as much attention. Such literature often deals with socialist planning in comparison to the market rather than in its own right. Planning is criticised because it supposedly does not have the same desirable qualities that markets have. For example, Ludwig von Mises and Friedrich von Hayek outlined how

markets enable rational economic decision making (von Mises 1920, 1922) and convey economic information (Hayek 2002, 1945, 1981). The focus of their analysis is thus the market and socialist planning is only discussed as an antithesis to the market that supposedly does not share the same virtues. This predominant focus on the market has in my opinion contributed to socialism and socialist planning being dismissed too quickly.

There has been some literature on the question of distributive justice under socialism, most notably by Jerry Cohen (2009). Cohen advocates a kind of luck-egalitarianism, which disallows inequality based on people's circumstances, rather than their choices (Gilbert & O'Neill 2019, Section 3.1). For other socialists, the starting point is Marx's famous principle for what he calls the higher stage of communism: *From Each According to his Abilities, to Each According to his Needs* (Marx 1999a, Part 1; Carens 2003; Gilbert 2015). Less attention has been given to Marx's description of the lower stage of communism (Marx 1999a, Part 1), which will be the starting point for my discussion of socialist distribution. Socialism has also been criticised as being in violation of principles of distributive justice by Robert Nozick (1974, 162-164).

Several models of socialism have been put forward (Gilbert & O'Neill 2019, Section 4), many of which compromise on the idea of (centralised) economic planning. Michael Albert's Parecon (Albert 2003) for example emphasises the direct participation of citizens in the planning process. Under *market socialist* models central planning is to a significant extent replaced with market processes or trial and error processes mimicking markets (Dickinson 1930, 1939, Lange 1936, Miller 1981). These models largely accept Mises's claim (von Mises 2008, 23) that markets are necessary for a rational economy. Some later models even allow for a form of private ownership of stocks (e.g. Roemer 1994). In the Soviet Union, some economists also emphasised the need for enterprises to operate to make a profit (Gloushkov 1969). The difference between capitalist profit and this *socialist profit* is that socialist profit is intended for projects benefiting workers. A model more clearly in the central planning tradition was put forward by Paul Cockshott and Allin Cottrell (Cockshott & Cottrell 1993) in their book *Towards a New Socialism* (TNS). The TNS model emphasises the potential of computer algorithms and information technology to aid in the planning of a socialist economy.

My thesis attempts to add to the existing literature by discussing issues of economic rationality and distribution in a planned socialist economy. Drawing on existing philosophical literature on distributional justice, I will propose principles of distribution for a socialist economy. Furthermore, I will argue that the critique of socialism by von Mises (1920, 1922) should be rejected. Based on this discussion I will derive a model of a socialist economy which represents a modified version of the TNS model (Cockshott & Cottrell 1993).

I shall focus on addressing objections to socialism and giving a positive account of reason-

able principles of distribution and planning. I will thus not critically engage with alternative models of socialism, other than the TNS model ([Cockshott & Cottrell 1993](#)) which has had a significant influence on my model. While political philosophers will find much that they are familiar with, at times I will step onto territory that might more properly be described as political economy or simply economics. Such a multi-disciplinary approach is necessary to do justice to the underlying issues.

By socialism, I shall refer to a form of social organisation in which the means of production are publicly owned, production in individual enterprises and transfer of goods between them is to a significant extent directed by a universal plan for the whole economy, and there are no significant class distinctions between members of the society. Public ownership of the means of production implies that enterprises and their machinery, tools, resources and so on are collectively owned and controlled by all members of society or by social institutions accountable to them and operating on their behalf. Worker-ownership under which workers have a distinct ownership stake in the enterprises they work for (c.f. [Ranis 2019](#)) should be seen as distinct from truly public ownership and thus does not meet my definition of socialism.

When all enterprises, including their assets and products, must be publicly owned, the transfer of products from a supplier of a product to a consuming enterprise implies no change in ownership rights and thus does not involve exchange or monetary payment. A socialist society as I understand it instead plans the production and transfer of such goods and instructs individual enterprises to act accordingly. Products are thus not bought or sold on an open market, but simply passed on from one enterprise to another. While all economies involve some form of planning of individual economic processes or enterprises, socialism extends this principle to the economy as a whole. This universal planning thus replaces the market exchange interactions between enterprises, which are typical of a capitalist economy.

Last but by no means least, a socialist society is a classless society. While people might still differ in terms of their roles in the economy – some people might do manual labour, while others hold managerial positions – there are no significant differences between these people in terms of rights, political power and access to economic goods. Unproductive members of society that live by the labour of others might do so for reasons of age or disability but not because they belong to some form of aristocracy given special privileges or because of interest on accumulated wealth.

All three criteria are necessary for a society to be socialist. Non-socialist societies might completely fulfil one or two of the criteria or partially fulfil all of them. But I do not consider them socialist unless all three criteria are fully met. For example, during wartime and during post-war reconstruction countries like the United States and France relied to a significant extent on planning to direct resources towards the war effort and reconstruction ([de Carvalho 2019](#)). However, neither did so by completely abolishing private ownership in the means of

productions and both maintained significant class differences. The thesis does not contain discussion of historical or contemporary ‘socialist’ countries, so I will not comment on the extent to which these might or might not have fulfilled the three criteria.

In my account of a socialist planned economy, I intend to address arguments against such an economy, as well as questions regarding the precise form such an economy should take. In the case of the ‘calculation argument’ ([von Mises 1920](#), see Chapter 6) against socialism, these two points overlap, since a successful objection to the argument mandates that socialism takes a form which does not fail on the grounds of economic rationality outlined by the argument. This is not the case for the ‘deontological objection’ to socialist distribution by [Nozick \(1974, 162-164, see Chapter 3\)](#). This objection fails on its own grounds and my considerations of the distribution under socialism (see Chapters 4 and 5) thus do not pay much attention to it.

A consideration of an alternative form of social organisation, as presented in this thesis, can be called ‘utopian’ or ‘utopianism’. Utopianism has been criticised from various directions as being unscientific and detached from reality (cf. [Nettl 1965, 73](#); [Geoghegan 1987, 40](#); [Popper 1945, 138-142](#); [Popper 1957, 64-70](#)). Chapter 2 therefore discusses these objections and argues that a scientific utopianism, as proposed by [Neurath \(2004a, 345-346\)](#), is possible. Scientific utopianism makes use of theoretical considerations and empirical foundations to design social institutions that best provide for social and individual needs. As with any scientific practice, scientific utopianism must include consideration of critical arguments. The so-called socialist calculation debate ([von Mises 1920](#), [Hayek 1981](#), [Greenwood 2006](#), [O’Neill 1996](#), [Steele 1992](#), [Neurath 2004b](#), [Cockshott 2010](#)) thus represents an exercise in scientific utopianism and such critical engagement should be encouraged. Proponents of a socialist society should address such arguments as I will do in Chapters 6 and 7. The purpose of Chapter 2 is to justify the project of developing a socialist utopia. Such a project is not doomed to fail from the beginning due to some systematic epistemic reason that might make rational engagement with alternative forms of social organisation impossible.

Chapters 3, 4 and 5 deal with the question of distributional justice. Chapter 3 provides a welfarist interpretation of Marx. According to this interpretation, economic systems based on exploitation should be rejected not because exploitation of workers constitutes a violation of workers’ entitlements, but because exploitation has negative consequences for their welfare. The purpose of the chapter is not to show that such an interpretation is the only possible or even the most literal interpretation of Marx. It is rather to show that a recognizably Marxist form of welfarism is possible and can provide a sensible basis for a discussion of distribution under socialism.

Chapter 3 also defends a welfare-oriented socialism against what I call the deontological objection to socialism, as formulated by Robert [Nozick \(1974, 162-164, see Section 3.3\)](#). According to Nozick, it is not free market capitalism, but socialism that violates entitlements

or property rights. Nozick thus suggests that socialism is necessarily unjust. I will argue that Nozick does not successfully demonstrate that such entitlements exist or should be taken seriously. We thus do not need to reject socialism on deontological grounds and distribution under socialism should not cater to the Nozickian concern for property rights.

In Chapters 4 and 5, I then consider the specific distributional mechanisms and patterns that ought to be implemented under socialism. The chapter assumes that consumer products are distributed to the population through tokens, similar to socialist labour token proposals (c.f. [Marx 1999a](#), Part 1). This leaves open two questions which are addressed in Chapters 4 and 5 respectively. The first question is according to which patterns tokens should be distributed to the population. The second question is what token prices various consumer items should have, i.e. how many tokens need to be redeemed for the various kinds of items.

For the distribution of tokens, I argue for a version of Abba Lerner's probabilistic egalitarianism ([Lerner 1944](#), 25-30). Under ignorance about individual differences an equal distribution of tokens will lead to the best expected outcome in terms of welfare. While such a distribution should be adjusted according to available knowledge, the strict ignorance condition serves as a reasonable baseline for distribution. However, I suggest that individuals should be allowed to substitute tokens for additional leisure time. The consequence of this is that the tokens received by workers would be closely linked to their labour time. This is not argued due to some entitlement that labour creates but is based purely on the welfare benefits of such a distribution.

Token prices should be set at market clearing prices which balance supply and demand. This does not only lead to the most efficient distribution of consumer products, but also serves to conserve the egalitarian distribution of tokens. To argue this, I draw on Ronald Dworkin's auction thought experiment ([Dworkin 1981](#); [Dworkin 2002](#), 65-73; [Dworkin 2011](#), 356-358). Dworkin recognised that a Walrasian auction ([Walras 2014](#)) is necessary in order to ensure that an equal distribution of tokens leads to an equal distribution of items. This is so because the market clearing prices resulting from such an auction are the most adequate measure of the opportunity cost that the appropriation of any one item inflicts upon others.

To summarise, in order to ensure the best welfare outcome, consumer products ought to be distributed equally before substitution between leisure and consumption has taken place. This can be achieved by giving each consumer an equal number of tokens. However, this is not enough to ensure equality. It is furthermore necessary to ensure that the token prices of items are set at market clearing rates.

Perhaps the most influential objection to socialism is Mises' calculation argument ([von Mises 1920](#), [1922](#)), which commenced the wider socialist calculation debate (c.f. [Hayek 1945](#), [1981](#), [2002](#), [Lange 1936](#), [Steele 1992](#), [O'Neill 1996](#), [Greenwood 2006](#), [Cockshott 2010](#)). Mises ar-

gues that in the absence of the monetary valuation provided by markets, including valuation of the factors of production, rational economic decision-making would be impossible. Chapter 6 discusses two interpretations of this argument. According to the first interpretation, Mises argument is about the nature of choice between competing ends. Mises claims that in order to make such a choice we must be able to commensurate the two options on a single scale. The question whether economic rationality is possible is about whether value judgements about ends are possible.

The alternative interpretation is that Mises's argument is not about ends, but about instrumental rationality. Socialism fails not because it makes it impossible to choose between various ends, but because planners cannot determine the best means of realising these ends. In a complex industrial economy, there are countless possible uses for the various factors of production, such as machinery and labour. Without market clearing prices to guide them, planners would not be able to identify where these factors are needed the most and thus cannot make a rational decision about their employment.

In a sense, I am doing Mises a favour by accepting his premise that an economic system must allow for rational decision-making. An arguably much better way of evaluating systems is to consider their consequences. Socialism could in principle have superior consequences for many people's welfare even if it does not allow for economic rationality. A poor person under capitalism, one might argue, is no better off because they can make rational decisions about how to spend their non-existent money. By accepting the framing of the debate between socialist planning and a capitalist market economy in terms of rationality, much of the misery of capitalism disappears. People under capitalism can seemingly make rational choices within the strict confinements presented to them. What those confinements are and what options people are left to choose from, however rationally, becomes irrelevant.

The reason I nonetheless accept the framing of the debate in terms of economic rationality is that socialists precisely claim ([Engels 1962](#), 264) that socialist planning allows for a more conscious and rational configuration of the economy, a claim which I support. So, while the ultimate criterion by which to judge socialism should be its consequences for people's welfare, I agree with Mises that the best outcome will likely be arrived at in a system in which productive factors are deployed in a rational manner. The question is thus whether Mises is correct in his claim that economic rationality is impossible under socialism.

Chapter 6 argues that both interpretations of Mises's argument fail individually, but that the strongest version of the calculation argument emerges when both interpretations are combined. The real challenge socialists must face is how to choose between competing ends, given the countless possible ways of achieving them, or between the various means, given the countless possible ends that could be achieved by them. One way of dealing with a vast number of possible plans is to use an optimisation algorithm, such as linear programming,

which directly solves for an optimised plan. The trouble is that this requires a prespecified objective, the fulfilment of which is to be optimised. I suggest that the choice of such a ‘plan target’ could be based on comparisons of market clearing prices and valuations that take into account the conditions of production. A similar proposal was made by Cockshott and Cottrell ([Cockshott & Cottrell 1993](#)). But while Cockshott and Cottrell rely on classical labour values, I propose a novel system of valuation based on opportunity cost. The resulting system chooses a plan under consideration of both the various possible ends and the available means and thereby offers a solution even to the strongest version of the calculation problem.

An alternative version of the calculation argument, perhaps better described as the information argument, was later developed by Friedrich August von Hayek ([Hayek 1945](#), [1981](#), [2002](#)). Hayek emphasised the role that the market price mechanism has in conveying dispersed information. This information, according to Hayek, cannot be centralised for planning purposes. This is because the information is dispersed and because of its tacit nature, which supposedly makes it impossible to communicate it. Thus, socialist planners would necessarily lack the information they need to plan the economy.

I have not included a separate discussion of Hayek, because I consider the information argument to be much weaker than Mises’s calculation argument. Hayek remains rather mysterious about what kind of information he means, why planners would need it and why it cannot be communicated to them. I do not see why any of the information needed for the model developed here to work could not be aggregated at a planning agency or even made publicly available. A proponent of Hayek’s argument that wishes to criticise my model should point out precisely which information required in the model she thinks cannot be communicated, why it cannot be communicated and why a planning agency would need it in the first place.

Technological circumstances have significantly changed since Mises and Hayek first questioned the feasibility of socialist planning. Modern computing and information technology can be used to transfer and process information much faster than ever before and this must be kept in mind when discussing the possibility of rational economic planning. I therefore suggest that the socialist economic system developed in this thesis be understood as an algorithmic process that could to a significant extent be run using computers and computer networks. This also makes it possible to simulate such a system on a computer, and a simplified simulation is outlined in Chapter 7.

The idea that computers and computer networks could be used to control a socialist economy is almost as old as the computer itself. In the 1940s American mathematician and philosopher Norbert [Wiener \(1965\)](#) and his associates developed the field of cybernetics, which views machines, organisms and social structures as control systems involving complex flows of information. Experts in the Soviet Union quickly came to see this as the right approach to dealing with the increasing complexity of the Soviet economy, giving rise to the Soviet cybernetics

movement (Gerovitch 2008, 2002). Long before the development of the internet, they put forward several never-to-be-realised proposals to build a nation-wide computer network that was to be used for both military and economic planning purposes. Actually put into practice was a much more low tech solution in Salvador Allende's Chile (Medina 2011, 71-72). The project CyberSyn was developed by British Cybernetician Stafford Beer and connected tele-fax machines in various factories with a central control room in Chile's presidential palace. From this control room the transportation of goods and materials could then be adjusted as new information came in.

Back in the Soviet Union, the idea of economic cybernetics was also thought in the context of Soviet research on optimal planning around the mathematician and economist Leonid Kantorovich (1960, 1965). Kantorovich first developed linear programming as an algorithmic method for solving optimisation problems he encountered in the Soviet economy (Kantorovich 1965, xvii-xix). While these problems could not be solved with conventional mathematical analysis, Kantorovich showed that they could be solved through a process of successive adjustments leading to an optimal solution. While linear programming can also be used to maximise profitability, Kantorovich used a non-monetary objective function. Linear programming can thus be applied in non-market settings, as it does not rely on market valuations.

The simplified model and its simulation outlined in Chapter 7 make use of linear programming with such a non-monetary objective function. Instead of monetary value, the physical output of a consumer good is maximised, while relative proportions of the output of various consumer products are fixed. The proportions are then successively adjusted through two feedback control loops which respond to the behaviour of consumers simulated by a simple agent-based model.

The purpose of the simulation is threefold. First of all, it demonstrates in more technical detail how the complete model developed throughout the thesis works. Secondly, it can be used to identify potential problems. And finally, I used it to specifically test how the model responds to environmental constraints and compared this to the labour value model of Cockshott & Cottrell (1993). The results clearly show that when a constraint on permissible greenhouse gas emissions is introduced, my model will often lead to a stronger shift in production towards low emission products. I argue that this shows that my opportunity cost valuations are a more adequate cost indicator than the labour values used in the Cockshott and Cottrell model.

The overall structure of the thesis ties in together as follows. Chapter 2 serves to establish the project as legitimate. The rational and scientific study of alternative forms of social organisations is possible and sensible. Chapter 3 then looks at Marx's views on distributive justice. While discussions about Marx and justice have mostly been framed around whether or not he thought capitalist exploitation was unjust, a welfarist interpretation is put forward

which can also serve as a basis for distribution under socialism. Nozick's deontological view on which he bases his objection to socialism is a stark contrast to this welfarist interpretation but is rejected after careful consideration. Chapters 4 and 5 then discuss precise principles for the distribution of consumer goods based on the general welfarist view of the previous chapter. Consumer goods are to be distributed based on an egalitarian distribution of tokens and clearing prices.

Chapter 6 then discusses the planning of production in the context of the calculation argument. The solution put forward draws on the clearing prices established in the previous chapter, as well as on optimal planning and opportunity cost valuation. This gives us the complete model which is then formulated in technical terms as part of the simulation presented in Chapter 7.

Chapter 2

Scientific Utopianism

This thesis is a work in utopian philosophy and economics. That is to say that it develops and defends an alternative, not yet existing, economic system on the basis of philosophical and economic considerations. The very practice of such a utopian exercise is highly controversial. This chapter will therefore consider some of the criticisms that have been raised against utopianism in general (rather than specific utopian proposals). I will argue for a form of utopianism that uses theoretical considerations in order to develop alternative social institutions. This is in line with the scientific utopianism proposed by Otto Neurath (2004a, 345-346). In particular, I will argue that the socialist calculation debate (cf. von Mises 1920, 1922, O'Neill 1996, 2003, Greenwood 2006, Steele 1992) about the feasibility of rational economic planning in a socialist economy constitutes a legitimate debate about the feasibility of socialism as a proposed alternative economic system to market capitalism. Engaging with such arguments about the feasibility of socialism, as I will be doing in later chapters, is thus not pointlessly speculative, but a fruitful endeavour that can lead to real insights about the possibilities of a socialist economy.

Ever since Thomas More's book of the name (More 2008), Utopia (literally meaning nowhere) has become synonymous with an imagined society that is organised according to moral ideals which the author considers to be superior to those of his own society. The utopian novel draws on the imagination of the author to demonstrate what is thought to be possible and by doing so criticises the status quo as inferior to what is achieved in the fictitious utopia. Today, 'utopian' also has a slightly different meaning. A utopian proposal is still one that intends to realise desirable moral principles, but the proposal is deemed to be impractical, if not impossible. Merriam Webster defines utopian as 'proposing or advocating impractically ideal social and political schemes' (Merriam Webster 2017). Labelling a proposal as 'utopian' has thus become a way of criticising and rejecting it as unrealistic. Utopianism has also become something of an antonym to science. The practice of the utopian, who designs non-existent social systems in his head, is considered to be contrary to the scientific study of reality. In

this chapter, I will thus examine the relationship of utopianism and science, as discussed by both proponents of socialism and critics.

2.1 The Utopian Novel

The original Utopia, by Thomas More (2008), was a novel. Similar such fictional accounts of lives in utopian societies have enjoyed some popularity in the centuries since its original publication. One such novel that was explicitly influenced by Marxism, was Alexander Bogdanov's 1908 *Red Star* (Bogdanov 1984), which depicts a communist society on Mars similar to the one Bogdanov wanted to build in Russia and on Earth as a member of the Bolsheviks. This section asks what such a fictional account of life in a communist society can tell us about the real possibilities of socialism.

In *Red Star*, the protagonist, a Bolshevik activist named Leonid, is taken to Mars by its inhabitants, so that he may witness the glorious communism on their home planet that now also awaits Russia. The reader is confronted with descriptions of various aspects of communist society on the red planet, including education, art, space exploration, and production. *Red Star* should not only be seen as a description of an ideal society, but also as a prediction about the actual future development of humanity. Bogdanov's belief that the development of Earth follows a more or less predictable path seems to be influenced by a strong interpretation of the Marxist theory of history. The author goes as far as suggesting that on Venus, which he imagined to be inhabited by dinosaurs at the time, humanoids would also evolve eventually and go through the same process of feudalism, capitalism and finally communism. Relatively minor deviations in biological and historical development are to be accounted for by geographical differences. The Martians, for example, evolved larger eyes as to better capture sunlight, which is more scarce on Mars. Historical Martian society was also less nationalist and as a result more peaceful, due to the lack of natural boundaries on Mars.

Whether authors of fiction can even remotely accurately predict the actual future development of humanity is a highly interesting question, but the less strong claim that they can describe possible alternate states of society is in itself intriguing enough. Surely, without the use of scientific methods of investigation, it is impossible to determine either the actuality or the possibility of a (future) state of society? According to one defender of utopianism (Stillmann 2001), the practice of the utopian author of fiction is not really that different to the practice of the scientist:

[U]topias are frequently like the thought experiments that modern scientists since Galileo have used [...]: the scientist thinks through what would happen in practice if the theory's hypotheses were tested. Similarly, the utopian author writes a utopia in order to discover and display 'what would happen if' a principle or principles were established as the major or dominant ones in a society. (Stillmann

2001, 13)

Stillman argues that, while the utopian does not perform experiments in reality, she performs them in the imaginary world created for that purpose. In this way, the utopian does not only test for logical consistency of the advocated principles, but also for consistency ‘in terms of whether the instantiations of the principles are mutually compatible’ (Stillmann 2001, 13-14). It is not clear what distinction, if any, Stillman sees between logical consistency and mutual compatibility. But he appears to suggest that there could be issues of compatibility when principles are put in practice, even when the principles on an abstract level appear to be consistent.

The anti-utopian can rightfully object to Stillman, that what is being tested are not real social possibilities, but rather the imagination of the author. Whether or not certain principles can be implemented in an imaginary society tells us very little about whether they can be implemented in reality, which may include both limitations and possibilities of which the author of fiction is not necessarily aware.

Consider the Martian society imagined by Alexander Bogdanov (1984). We are told that the economy is organised through the calculation of the necessity for various kinds of labour, which is then publicly displayed in tables. The author does not tell us how these tables are determined, we only learn that it seems to work well enough and that the Martians live in relative prosperity, even though natural resources on their planet are scarce. The fact that Bogdanov can imagine the economy being organised in such a manner and the end result being desirable, unfortunately tells us relatively little about whether this would really be so. We are given no reason to believe the end result would be as imagined by Bogdanov. Moreover, we are not even given very much detail about how Bogdanov imagines the economic process to work.

This is not to dismiss the merit of utopian novels. They may be a great source of inspiration, perhaps even more so than other works of fiction. They can also be used by the author to communicate ideas about how we could organise our social relations. But the value of utopian novels perhaps lies more in posing the question “Could we live like this?”, rather than providing an epistemically justified answer. The actual realisability of the ideals expressed in the novel require additional scrutiny, for which creative imagination is insufficient.

2.2 Marxism and Utopian Socialism

Marx and Engels, as well as later Marxists, directed significant criticism towards what they called ‘Utopian Socialism’. This section largely follows Geoghegan’s account of Marxist views on Utopian Socialism (Geoghegan 1987) to demonstrate that Marx and later followers

rejected Utopian Socialism for very different reasons. While the latter rejected any consideration of what an alternative to capitalism might look like as unscientific, Marx's criticism of the utopians was much more narrow and does not apply to the utopian considerations that I will make in later chapters. In the next section, I will then argue that the incompatibility of utopianism with scientific practice supposed by some of Marx's followers does not hold up to scrutiny.

The term 'Utopian Socialism' has primarily become associated with three political visionaries of the late 18th and early 19th century; Henri Saint-Simon (1760-1825), Robert Owen (1771-1858), and Charles Fourier (1772-1837) (cf. [Geoghegan 1987](#), 1-13). They were utopians in the sense that they developed elaborate visions of an alternative society. But they would not necessarily have accepted the term utopian, due to its connotation with detachment from reality. Owen in particular, 'prided himself on having tested his theories in reality' ([Geoghegan 1987](#), 13):

Some of the best intentioned among the various classes in society may still say, 'All this is very delightful and very beautiful in theory, but visionaries alone expect to see it realized.' To this remark only one reply can or ought to be made; that these principles have been carried most successfully into practice.

The present Essays [A New View of Society] therefore are not brought forward as mere matter of speculation, to amuse the idle visionary who thinks in his closet, and never acts in the world. ([Owen 1967](#), 271, quoted in [Geoghegan 1987](#), 13)

Owen's ideas were carried into practice through the establishment of small communities, which he hoped would eventually grow in number and replace the old social order ([Geoghegan 1987](#), 13). The communities functioned both as a first building block of the new society and as a proof of concept.

Marx and Engels admired the above mentioned visionaries, although they had few kind words for their later followers. In their minds, the utopian socialists had not realized the real process under which an alternative society could emerge. Change would not come about by appealing to the reason of the members of all social classes alike, or by demonstrating the advantages of the new social order in small communities. Instead, they emphasised the existence of a fundamental class antagonism, which could only be resolved by the organised struggle of the oppressed working class. In the *Communist Manifesto*, they write of the utopian socialists:

The inventors of these systems saw the antagonism between classes, as well as the effect of the dissolving elements of the dominant society themselves. But on the side of the proletariat they saw no historical agency, no specific political movement.

Since the development of class antagonism goes at an equal pace as the development of industry, they also do not find the material conditions for the liberation

of the proletariat and look for a social science, social laws which will generate these conditions.

In the place of historical practice must step their personal inventive practice, fantastical in the place of historical conditions of liberation, a specially designed organisation of society in the place of a gradually developing organisation of the proletariat as a class. The coming world history dissolves in propaganda and practical execution of their social plans. (Marx & Engels 1972, 490)

The problem with the utopian socialists was not that they were proposing and experimenting with alternative social models. It was that they thought that this alone would make these social models become reality. But this, according to Marx, requires organised class struggle in which the working class defeats the ruling capitalist class, which has no interest in changing the status quo. The original utopian socialists are excused from this criticism, because the material circumstances of their time did not allow them to know better (Geoghegan 1987, 29-40). But with the emergence of an organised working class movement, the disregard their followers had for this movement was considered inexcusable.

Though written after Marx's death, a good example for the attitude criticised by Marx and Engels is perhaps given by the utopian novel *Looking Backward* by Edward Bellamy (1967). It tells the story of a man of the 19th century that wakes up in the year 2000 and discovers the futuristic utopian society in place at that time. While the described society shares many characteristics of a socialist society, such as complete nationalisation of industry, it did not come about through revolution or class struggle. In fact, labour strikes are portrayed as part of the problem of 19th century industrial society, rather than part of the solution. Change away from 19th century capitalism is described to have come about through common agreement of all classes, due to the thoughtful insight that the former system needed to be replaced by a more rational one.

The utopianism I will engage in in later chapters does not rest on the same assumptions. In fact, I will remain largely silent on the matter of how a socialist society might come about. For all that it matters, I agree with the Marxist view that the interests of members of the capitalist and working classes divert when it comes to the introduction of socialism. Socialism abolishes class differences and thus the privileges members of the capitalist class enjoy. While there might be some general advantages of a socialist economy due to a more rational organisation of the economy, this is unlikely to make up for the privileges the capitalists lose. So, even if I am successful in establishing socialism as a viable and desirable (for workers) alternative to contemporary capitalism, this does not mean that it is also desirable for capitalists.

One of the major advantages I see in a socialist society, which will be discussed in the following two chapters, is that it distributes products more equally and thus takes care of more urgent basic needs of the working class over luxury consumption for the rich. While this benefits the working class, it does not benefit those that would otherwise be rich. The latter thus

have no self-interest in the introduction of a socialist society and would support it only out of stupidity, moral conviction or sympathy towards the working class.

The purpose of this work is thus not to create a class-consensus around socialism, which seems to have been the goal of Bellamy. Instead, I intend to answer questions which are interesting in their own right from an academic perspective and are also of critical relevance for any movement or social force that might aim to establish a socialist society. If I am successful in showing that objections against the feasibility of socialism are unwarranted, this might also help to give new hope to those who are critical of capitalism but have become demoralised by an apparent lack of alternative. Discussion of the details of a socialist economy should thus be seen as academic assistance to socialist workers' movements and not as an ivory tower alternative to class struggle.

This perspective is in stark contrast to the interpretation of the Marxist critique of Utopian Socialism by the Second International and the associated German Social Democratic Party (SPD), who came to reject any speculation concerning the future. Talk of post-revolutionary society was an absolute taboo. Peter [Nettl \(1965, 73\)](#) discovered that from all articles published in *Neue Zeit*, the theoretical journal of the SPD, only one touched on the matter at all, dealing with the question from a purely historical perspective. Throughout the era of the Second International, dominant socialist thinkers considered any discussion of future society unscientific. This attitude was aptly summarised by Karl Korsch:

[T]he majority of spokesmen of revolutionary socialism sought to guarantee the 'scientific' character of the Marxian doctrine by rejecting from the beginning every attempted clarification of the following question as a relapse into pre-Marxian ideology and utopianism: How on the basis of each economic and social-psychological stage of development, can the socialistic demand 'socialization of the means of production' be practically realized? ([Korsch 1977, 127](#), quoted in [Geoghegan 1987, 40](#))

It is doubtful whether such a complete rejection of visionary and utopian thinking was intended by Marx and Engels. In fact, they clearly indicated that they agreed with the society that the utopian socialists envisaged. It was only the way to get there that they disagreed on, as demonstrated in Marx's writing on the Parisian revolt of 1871:

From the moment the working men's class movement became real the fantastic utopias evanesced - not because the working class had given up the end aimed at by the Utopians, but because they had found the real means to realise them - but in their place came a real insight into the historical conditions of the movement and a more and more gathering force of the militant organisation of the working class. But the last two ends of the movement proclaimed by the Utopians are the last ends proclaimed by the Paris Revolution and by the International. Only the

means are different and the real conditions of the movement are no longer clouded in utopian fables. (Marx & Engels 1980, 166, quoted in Geoghegan 1987, 29-30)

The goals of the Utopians, their alternative social models, were not the problem for Marx. In fact, he clearly expresses support for these. The Utopians were unscientific, only insofar as they had not properly studied the conditions for their realisation, which Marx thought was to be found in the organised struggle of the working class.

Whether or not the Second International's rejection of 'utopianism' as unscientific is in the spirit of Marx, it poses an interesting question: Under what conditions, if any, can the devising of social systems as practised by the likes of Owen be considered scientific? Geoghegan (1987, 40) objects to the rejection of 'utopianism' as unscientific on the grounds that it is based on a 'narrow, positivistic' conception of science. But, as we shall see, it was Otto Neurath (2004a, 345-346), a representative of the left wing of the logical positivist Vienna circle, that defied the dominant socialist thought of his time by championing a *scientific utopianism*.

2.3 Scientific Utopianism

The Second International's rejection of Utopianism as unscientific is an example of the common misconception that science is not concerned with the future. The future cannot be tested and measured, or so the thought goes, and thus it cannot be studied by science. Contrary to this view, predictions about future events are in fact at the core of science. Yet unestablished hypotheses are evaluated by their predictions about the outcome of future experiments or observations. If predictions turn out to be inaccurate, the hypothesis has to be rejected or amended, while predictive success may lead to its acceptance. Already established theories can in turn be used to derive predictions about future concrete events of which the scientist can then be relatively certain, given her justified belief in the general principles from which the predictions are derived. The theory of gravity, for example, has had a high empirical success in predicting and explaining the observed movement of celestial bodies. Once the theory had been established, it could be used to predict the further movement of the bodies and it was even possible to successfully predict the existence of Neptune, which had at that point not been directly observed, due to its gravitational influence on other planets (Schurz 2013, 262-263). In some cases, science can even become quite detached from the empirical basis it rests on and make use of highly abstract theoretical models to analyse potential or actual states of affairs.

The principles of science are also applied by the engineer, when creating novel devices or systems to serve some specified desired purpose. The engineer uses her knowledge of the laws of statics, thermodynamics or electricity to design the device in such a way that she can anticipate it to work in the required manner. While there may be an element of trial and error

involved, the established theories and principles the engineer uses in many cases allow for prior knowledge of the design required for a given purpose. When a bridge is built, how it will behave under stress is usually determined before disaster occurs. Structural engineers do this by utilising the well-established principles of statics.

Neurath advocated a scientific utopianism, which he also referred to as ‘social engineering’ (Neurath 2004a, 346). The chief task of the economist, for Neurath, is to determine how various political and economic institutions effect the conditions of life. These are given by the amount and kind of food consumed, quality of housing, germs and health care, entertainment and education, as well as feelings of freedom and social belonging. Neurath refers to this as ‘social Epicureanism’ (Neurath 1973a, 289). The chief interest is, as for Epicurus, that of well-being and a happy life. However, the concern is not with the influence on well-being from individual actions, but rather with the impact of social institutions.

The social engineer then attempts to use theoretical models and social scientific insight to devise a political and economic system which is expected to better the conditions of life of the members of society. The drawing up of such blue prints of a better society is not a purely scholastic exercise, but intended to help bring such a society about. However, in contrast to the ‘utopianism’ criticised by Marx and Engels, Neurath did not appear to view such social engineering as detached from or opposed to the struggle of a labour movement. Rather, it is intended to give such a movement a clear goal for which to struggle, and to demonstrate that this goal is feasible.

As mentioned in the previous section, Robert Owen also did not consider his ideas of a better society to be mere figments of the imagination (Owen 1967, 271; Geoghegan 1987, 13). But, while Neurath emphasised a theoretical methodology, Owen thought that the practical establishment of his society in small communities demonstrated its feasibility. There can be no doubt that such empirical examples have a certain epistemic value. However, there are significant limitations to this value. Whether or not a way of organising society works for a small community may not mean that it is or is not feasible for a society of a larger size. It may be that the principles only work when the number of participants are limited. On the other hand it is also possible that the social system does not work in an island within a larger society that adheres to wholly different principles. Countless other possibilities for why the insight about small communities may not be transferred to larger societies can be imagined. This limits the insight that can be gained from the success or failure of such small-scale experiments.

The underlying problem is one of social science more generally, namely that societies cannot be created and manipulated as to gain empirical data in the way that it is often possible in experiments for the purpose of studying nature. Neurath’s social engineer thus has limited direct empirical evidence to work with. This does not mean such social engineering is doomed

to fail. Instead, we can rely on empirically informed fundamental assumptions about human behaviour and society, considerations of logical or technical restrictions, as well as historical observations to make informed predictions about the social consequences of new or altered social institutions. One way that scientists today are investigating states of affairs which are not easily observable or simply have not come about (yet), is through computer modelling. It makes sense to do the same when investigating a socialist economy, and I will make use of such a computer model in Chapter 7.

2.4 Piecemeal vs Utopian Social Engineering

Opposition to the social engineering of Neurath came from philosopher Karl Popper ([Popper 1945](#), 138-142; [Popper 1957](#), 64-70). Popper was not opposed to the idea of social engineering altogether, but differentiated between piecemeal social engineering, which he deemed desirable, and utopian social engineering, which he rejected. While utopian social engineering, like that of Neurath, aims to remake society as a whole, piecemeal social engineering proposes small changes which might improve society as it is already given. One cannot help but notice a certain parallel to the antagonism between revolution and reform. The revolutionary, utopian social engineer wants to do away with society as we know it and recreate it according to her ideals, while the piecemeal social engineer wants to discover small, practical reforms as fixes for social problems. These minor amendments can only completely transform society over a long period of time, and do not necessarily have a certain end goal in mind. This is where Popper sees a crucial difference of his own approach to what he identifies as the rationale of utopian social engineering:

Any rational action must have a certain aim. It is rational in the same degree as it pursues its aim consciously and consistently, and as it determines its means according to this end. To choose the end is therefore the first thing we have to do if we wish to act rationally; and we must be careful to determine our real or ultimate ends, from which we must distinguish clearly those intermediate or partial ends which actually are only means, or steps on the way, to the ultimate end. If we neglect this distinction, then we must also neglect to ask whether these partial ends are likely to promote the ultimate end, and accordingly, we must fail to act rationally. These principles, if applied to the realm of political activity, demand that we must determine our ultimate political aim, or the Ideal State, before taking any practical action. Only when this ultimate aim is determined, in rough outlines at least, only when we are in the possession of something like a blueprint of the society at which we aim, only then can we begin to consider the best ways and means of its realization, and to draw up a plan for practical action. These are the necessary preliminaries of any practical political move that can be called rational, and especially of social engineering. This is, in brief, the methodological approach which I call Utopian engineering. ([Popper 1945](#), 138)

It is not clear whether Popper's description of the reasoning of utopian engineering accurately

captures the motivation of Otto Neurath. Neurath certainly had a kind of instrumental rationality in mind, but the ultimate goal this rationality was aimed at was the improvement of the conditions of life and the welfare of the members of society. His ‘ideal society’ was not a goal in and of itself, but only a means for the betterment of the human condition. One reason Neurath might have given for this necessitating a radical restructuring of society is that the given economic institutions and principles did such a poor job at providing for the needs of the majority of people, as these institutions and principles were not rationally devised for that purpose. In his critique of the society of his time, Neurath frequently draws upon Marxist political economy and in particular stresses the underutilisation of productive resources, which he thought was inherent to capitalism (Neurath 2004c, 378-379). If social ills are not contingent, but necessitated by the underlying economic principles guiding society, this might suggest that radical reconstruction is necessary to fix them.

Popper, however, warns of the dangers of such radical reconstruction due to social complexity:

Social life is so complicated that few men, or none at all, could judge a blueprint for social engineering on the grand scale; whether it be practicable; whether it would result in a real improvement; what kind of suffering it may involve; and what may be the means for its realization. (Popper 1945, 139-140)

Any scientific approach to social change must be based upon experience. But, as mentioned above, such experience is hard to come by for the social engineer. ‘At present’, Popper claims, ‘the sociological knowledge necessary for large-scale engineering is simply non-existent’ (Popper 1945, 142). Without this sociological knowledge, it is impossible to predict the consequences of radical changes to the fabric of society and any such changes will thus be likely to have unintended repercussions. The small amendments of the piecemeal social engineer, on the other hand, can be predicted more easily and if the reforms do not work out as planned, they can be readily reversed.

In essence, Popper’s argument is that piecemeal engineering is the safer route. There are multiple problems with this claim, several of which relate to his omission of any potential costs of not engaging in utopian social engineering. As presented by Popper, both piecemeal and utopian social engineering can potentially fix social problems. But with utopian social engineering there is the added risk of irreversible unintended consequences. Piecemeal engineering is thus preferable.

In reality, both utopian engineering and the absence of utopian engineering can have significant negative consequences. First of all, the status quo contains all the social problems which the social engineer intends to address. While the possible unintended consequences of social engineering only constitute potential problems, the status quo can be directly ob-

served, and the problems associated with it are thus known to exist with relative certainty. When weighing the costs and benefits of engaging in social engineering, we should thus give a greater weight to these issues based on the higher epistemic certainty with which we can expect them to occur should these issues not be addressed. Should we not engage in appropriate social engineering, there is substantial risk that social problems will persist.

Secondly, Popper's assessment relies on the implicit assumption that change for the worse can only occur as a result of the careless action of a utopian social engineer. It is, however, just as possible for inaction to lead to such consequences. Societies are dynamic systems within a dynamic environment which do not necessarily require the conscious action of a social engineer or political movement based on social engineering in order to evolve. Resulting changes may well be for the worse and thus have as drastic consequences as the unintended effects of social engineering. This might for example be true if the Marxist claim that capitalism has an inherent tendency towards crisis is correct (Marx 1999b, Chapter 13). A current concern is the emission of greenhouse gases which leads to increased global temperatures, which are in turn expected to negatively affect humanities' food supply, among other things (IPCC 2014, 69). Preventing these consequences requires significant changes in the world's energy and transportation systems (IPCC 2014, 98-103) and failure to implement these changes could thus have serious negative consequences.

Clearly, Popper's outright rejection of utopian social engineering is not warranted. Instead of dismissing utopian social engineering under all possible circumstances, we have to consider the expected consequences of both implementation and absence of implementation of utopian social engineering programs. As with any action, we must consider the possible alternatives to decide whether an option represents a reasonable choice, a theme that I will continue to explore for planning within a socialist society in later chapters. But in order to make such a comparison we must first engage in utopian social engineering — not in practice, but on the drawing board. This way we can explore possibilities, limitations and of course also potential risks before reaching a hasty conclusion on whether utopian social engineering programs should be put into practice or not.

Of course, Popper does not suggest we simply ignore problems with present social systems. He does present his piecemeal engineering as an alternative approach to addressing these issues. But this approach depends entirely on whether a series of small-scale reforms can really be effective in addressing underlying issues. I do not intend to suggest that they are in principle incapable of bringing about improvements, but whether this is the case or not must be investigated on a case by case basis. This might involve both prior deliberation as well as actually putting such measures into practice to test them, as Popper would have us do. But it might well be the case that, after trying several piecemeal changes, we come to the conclusion that an issue simply cannot be fixed by minor reforms, or that fixing the issue in such a way would take too long and would thus unnecessarily elongate social ills and the

associated suffering.

There might also be structural reasons that prevent piecemeal engineering from being successful. Piecemeal engineering relies on every step on the way being an improvement over the previous step, since Popper suggests the step should be reversed if it does not lead to an improvement or if it makes things worse. There is a certain parallel to evolution by natural selection here. A trait that occurs in an organism will spread only if it constitutes some improvement, in terms of fitness, over alternate traits. Over time several such changes can accumulate to lead to a very different organism, though there was no force that had foreseen this organism or planned for it to come about. But only organisms or traits that can be reached through such small, improving steps can be reached in this way.

Sewall [Wright \(1932\)](#) proposed visualising this through a fitness landscape (see Figure 2.1), a concept later popularised by Richard [Dawkins \(1996\)](#). The higher the altitude of an organism in the landscape, the higher its fitness. Natural selection will tend to move the organism towards nearby positions which are elevated above the previous position. The organism thus slowly moves uphill, until eventually it reaches a hill top or *Mount Improbable* ([Dawkins 1996](#)). But in order to do so, it must follow a smooth slope (representing small improvements). It is not able to climb steep cliffs.

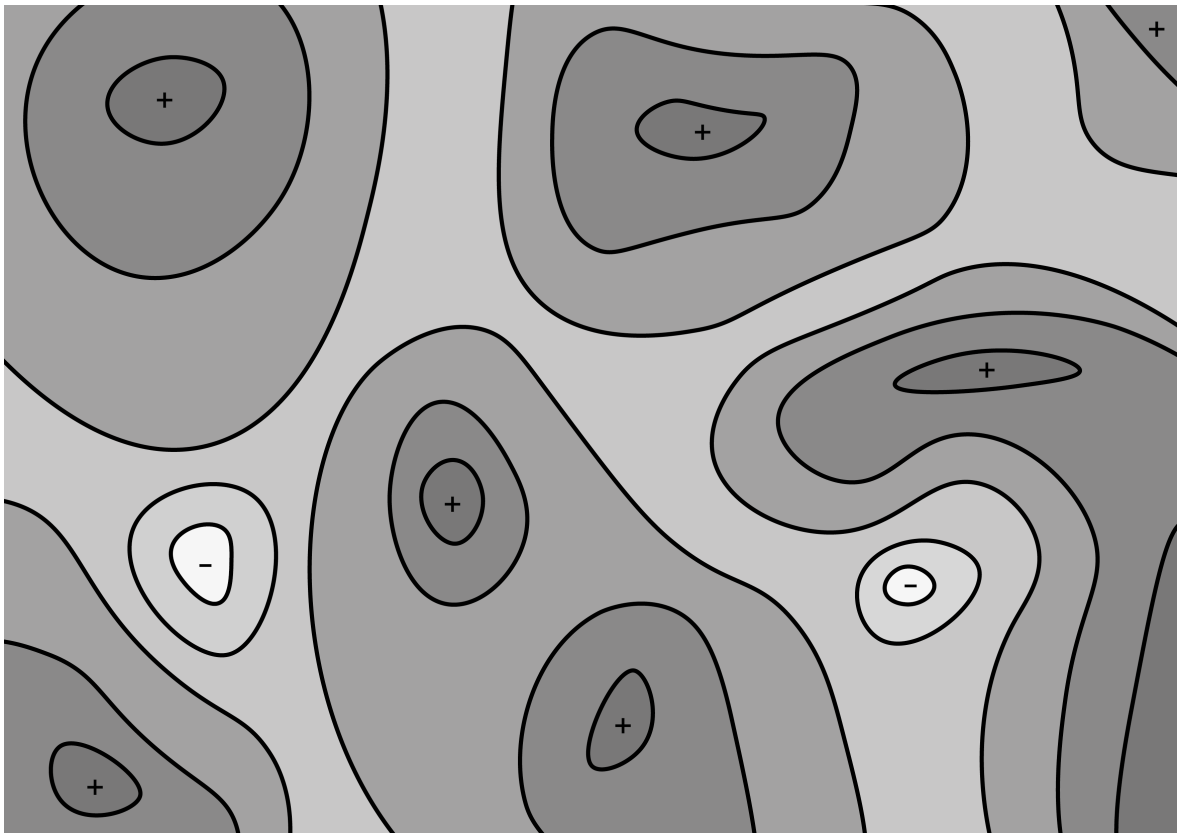


Figure 2.1: Fitness landscape. Contour lines indicate level of fitness. Pluses and minuses indicate hilltops and valleys respectively. The image was provided to me by Nils Wassilijew and is based on a similar image by [Wright \(1932, 357\)](#).

Piecemeal engineering works much in the same way. Drastic, sudden changes which would

allow one to climb a steep cliff are prohibited. In some cases, one might still be able to reach the top of the cliff without more radical changes. The path would only take longer as the elevation has to be approached from a different angle, which may require a significant detour. But there are more serious limitations to both natural selection and piecemeal engineering. If a low point is completely surrounded by steep cliffs, there is simply no way out of it. Similarly, there might be a peak that is unreachable through a smooth slope. While intelligent design or utopian engineering would allow us to climb the peak, it remains unreachable by natural selection or piecemeal reforms. The case of the valley represents a social institution or system that cannot be improved through small reform. The unreachable peak represents a very well-functioning institution that cannot be created through small changes to our current institutions. Both possibilities represent problems for the piecemeal approach, but not for the utopian engineering approach.

Another limitation, again first formulated in our landscape analogy, is that one cannot change from one hill to a neighbouring one that is higher. Once you have started making your way up one hill, you would have to go back down to the valley first before climbing another hill. But such moves are not allowed, as the point of piecemeal engineering is that reforms should be reversed if they are found to have an adverse effect. A social engineer with foresight that finds herself on a small hill might make the way downhill and cross a valley to climb a higher neighbouring hill. Popper's piecemeal engineer is forbidden from having such foresight and the moment his engineer takes a step downhill, she must immediately reverse the step, since taken individually it constitutes a worsening of the situation. The piecemeal engineer must thus work with historically developed institutions, even when the limitations of these become apparent. She cannot reconstruct them in a completely new way that would better serve their purpose.

In summary, it cannot be said that piecemeal engineering should be preferred over utopian social engineering in all cases. Both are affected by epistemic uncertainty and piecemeal engineering can have serious limitations in some hypothetical cases. In order to decide whether piecemeal or utopian engineering is more appropriate, we thus have to study the social circumstances and likely consequences of both approaches, in order to reduce uncertainties and identify possible issues. Popper's proposal is to simply surrender to epistemic limitations and opt for piecemeal engineering by default. It is not at all clear that this will lead to a better expected outcome than utopian engineering. This can only be decided based on an evaluation of competing solutions to specific problems which follow both approaches. Such an evaluation should be based on the best obtainable knowledge about relevant social and technical factors. In order to make such a decision it is thus necessary to engage in precisely the kind of utopian exercise that will play out in succeeding chapters.

2.5 Scientific Utopianism and the Socialist Calculation Debate

This thesis is in part a response to the Socialist Calculation Debate, a series of discussions on whether socialism constitutes a feasible alternative to a capitalist market economy (cf. [von Mises 1920, 1922](#), [O'Neill 1996, 2003](#), [Greenwood 2006](#), [Steele 1992](#)). If one agrees either with the anti-utopianism of the Second International (cf. [Geoghegan 1987](#), 29-40) or that of Popper ([Popper 1945](#), 138-142; [Popper 1957](#), 64-70), one might be led to believe that engaging in such a theoretical debate about a radically different economic system is an utterly pointless exercise. Without directly observing such an economic system, how can we make any credible claims about what is or is not possible in a socialist framework?

Perhaps the only reasonable approach to take is investigating this issue from an empirical perspective, by looking at real attempts to implement such ideas on a large scale, such as in the Soviet Union. Such an empirical approach no doubt has its place, but I contend that substantial insight can also be gained by engaging with the theoretical arguments raised against socialism as part of the calculation debate ([von Mises 1920, 1922](#)). Ludwig von Mises's calculation argument, which I will look at in detail in Chapter 6, relies on fundamental assumptions about human capabilities, the nature of rational choice, the complexity of modern industrial economies and technical possibilities to build a case against the feasibility of socialism. Rather than dismissing such concerns as pointless speculation, or perhaps uncritically accepting Mises's warning about socialism as a real danger that cannot be ruled out in the light of limited empirical observations, we should critically examine Mises's assumptions and whether his conclusions follow from them.

In a sense, Mises's use of theoretical considerations makes his objection to socialism stronger than those based on the supposed historical failures of socialism, as they cannot be dismissed as being the result of a bad execution of socialist ideals or unfavourable historical circumstances. If Mises's argument is correct, then socialism cannot work as intended under any circumstances, something that should be of concern to anyone that is serious about the implementation of a socialist agenda. While Mises's objection to socialism was in large part a response to Otto Neurath's socialist economics ([Neurath 2004a,b,c](#)), Mises in a way participated in the scientific utopianism that Neurath advocated. Scientific utopianism does not entail the blind acceptance of utopian promises, but the utilisation of scientific methods to investigate what can be achieved and by what means. Like any scientific endeavour, this must necessarily include the kind of critical scrutiny that Mises has provided.

Mises contested that socialism could under no circumstances allow for rational decision making about the utilisation of productive factors in a complex industrial economy ([von Mises 1920](#)). While I will argue that Mises's objection is not convincing, I think the considerations

made by him nonetheless tell us something about the kind of socialism that we should implement. It must be a kind of socialism that precisely manages to avoid his objection, by being based on mechanisms and methods which do allow us to plan the economy in a way that ensures a desirable outcome. This means avoiding unnecessary labour burdens and environmental degradation, while providing plentiful consumer products of the right kind to the population. My response to Mises is thus intended to show not only that rational economic planning is possible in a socialist society, but also how.

2.6 Conclusion

In this chapter, I have considered the merits of both utopian fiction and the scientific study of utopias. While fiction can be a great source of inspiration, a more rigorous scientific study of any proposals for alternative forms of social organisation, as in Neurath's scientific utopianism (Neurath 2004a, 345-346), is clearly necessary. The Second International's outright dismissal of the study of alternative forms of social organisation (cf. Nettl 1965, 73; Geoghegan 1987, 40; Korsch 1977, 127)) is not warranted and rests on a misinterpretation of Marx's critique of utopian socialism. Marx criticised the utopians not because he did not believe in their utopian visions, but because he accused them of not having found the right way of achieving them. Socialism would come about, not through rational insight of all classes alike, but through the victorious struggle of the working class.

Popper

Chapter 3

Exploitation, Justice and Welfare

The chapter will consider the normative grounds on which to evaluate socialism. Such normative grounds are important for two reasons. First of all, they are necessary in order to argue why capitalism ought to be replaced with a socialist economic system. Without some normative criterion we might be able to describe the capitalist system and possible alternative socialist systems and their consequences, but we would be lacking any sort of rule by which to decide which system is preferable. As I have outlined in the introduction, a positive case for socialism is not of primary concern in this thesis. However, this chapter will discuss normative grounds on which socialists might reject capitalism because the same normative grounds can tell us something about the kind of socialist system that should replace capitalism.

This is the second and for the purpose of this thesis the more important reason to discuss such fundamental normative criteria. They are significant when deciding between different possible socialist systems, or when deciding upon details of a socialist system. There may well be several ways to run an economy that is recognizably socialist, but that differ in some contingent aspects. We thus need to be able to specify on which grounds we decide to opt for any particular one of those alternatives. After outlining the general normative criteria in this chapter, we will apply them to consider what kind of distributional patterns and mechanisms should be applied in a socialist society in the next chapter.

Two general normative approaches will be considered. The first approach is in the tradition of [Locke \(2008\)](#) and argues that individuals can become entitled to certain material objects. Such an assumption has been used to argue both for ([Cohen 2014](#)) and against ([Nozick 1974](#), 162-164) socialism. In the case of Nozick this is combined with a deontological ethics ([Nozick 1974](#), 29-31). According to Nozick, individuals are or can become holders of (property) rights. These rights forbid others to act in a way that violates those rights. I will advocate against rights-based approaches and argue that instead we should be evaluating capitalism and socialism based on their consequences for peoples' welfare. This position can be de-

scribed as broadly welfarist, as it is a form of consequentialism that is exclusively concerned with consequences in terms of welfare (Sen 1979, 468). Since rights-based concerns about capitalism and socialism should be dismissed, this allows us to focus our attention on a discussion of the consequences of various conceivable socialist systems in other chapters.

The first section gives a brief explanation of the Marxist concept of exploitation and gives a series of examples which are meant to give intuitive plausibility to the notion that capitalism ought to be rejected on the basis of exploitation. It also provides a brief summary of scholarly debates on Marx's view on justice roughly following the account of Geras (1985, 1992). These debates have largely focused on whether Marx thought that exploitation was unjust because it deprived workers from the value that they have created through their labour and are thus entitled to. According to this view, Marx holds a broadly Lockean view of property rights in which workers are entitled to certain parts of the social product due to their work effort in creating them (Shapiro 1991).

The second section then argues that Marx's concern for human needs speaks in favour of a welfarist interpretation, in which welfare is understood in terms of need satisfaction. The welfarist account provided contrasts with the view that capitalism is unjust because it violates worker's entitlements through exploitation. Instead, Marx's theory of exploitation should be seen as an economic theory of the formation of class society. Exploitation is simply the mechanism by which wealth is accumulated by the ruling class, while subordinate classes of people are systematically deprived of their ability to satisfy their needs. Not only does the welfarist account provide a plausible interpretation of Marx, but it constitutes a sensible and practical framework from which Marxists can argue for socialism and evaluate possible alternative ways of implementing socialism. When discussing questions of how to implement a socialist economic system in later chapters, we will thus consider it in terms of what can be expected to best serve human welfare.

The final section will consider Nozick's deontological objection to socialism (Nozick 1974, 162-164). According to Nozick, any consideration of welfare or other consequences is constrained by the obligation to not violate individual rights, including property rights. His historical entitlement theory of justice holds that a distribution is just as long as it has come about through just processes of acquisition and transfer of property rights. Socialism must necessarily violate such property rights if individuals can indeed come to be entitled to such rights. Unfortunately for Nozick, he lacks a clear account of how property rights are first gained. Without a plausible theory of acquisition his entire conception of justice is baseless, a weakness that has long been pointed out in the literature (Wolff 1991, Chapter 4). I will argue that Nozick's problem lies in the way that he has construed the concept of right as a side-constraint on the actions of others. Since Nozick fails to provide sufficient reason to consider that there are property rights which require strict adherence, socialists are free to contemplate socialism purely on grounds of welfare. Remaining chapters will thus focus on

a consideration of the material consequences of socialism, rather than its implications for rights or entitlements.

3.1 Exploitation and Injustice

This section briefly introduces the Marxist concept of exploitation and attempts to give some intuitive plausibility to the idea that exploitation deserves moral condemnation. This will be followed by a brief sketch of the scholarly debate on whether Marx thought that exploitation was unjust. According to the normative reading of the theory of exploitation, workers are being deprived of value that they are entitled to. [Shapiro \(1991\)](#) notes that the Marxian theory of exploitation derives from the Lockean workmanship ideal. According to Locke, ‘labour is unquestionably the property of the labourer, so no other man [sic] can have a right to anything the labour is joined to’ ([Locke 2008](#), 11). Shapiro credits Marx with radically transforming the workmanship ideal by ‘secularizing it and locating it in a dynamic theory of historical change’ ([Shapiro 1991](#), 51). He frees the workmanship ideal from Locke’s theological assumption and puts it at the centre of his understanding of history as ‘the history of class struggles’ ([Marx & Engels 2010](#), 14).

Arguably the most important divergence from Locke is that Marx recognized production as a social process. In Locke’s imagination labourers go through the world as individuals, mixing their labour with natural resources they happen to find by picking apples from trees and so on ([Locke 2008](#), 11). The modern factory, however, relies on the collective efforts of dozens of workers, each responsible for a different step in production. Until a finished good has been created various people will have contributed their labour in various steps of the production process. Feminists have long contended that this does not just include the labour of wage workers, but also the mostly unpaid domestic labour needed for the reproduction of labour power ([Benston 1969](#), [Morton 1972](#)), further contributing to the recognition of production as a social process. This recognition necessitates a measure for the individual contribution of labourers to the social product. For Marx, this measure is given by the labour theory of value ([Marx 2008](#), 49-84), though others have suggested that the labour theory of value is not necessary to make sense of the theory of exploitation ([Cohen 2014](#)). The value of the product is measured as the socially necessary labour time for its production, and the share that might be associated with any individual is measured by her labour contribution.

Marx’s analysis of capitalism suggests that under capitalism a significant portion of the value produced by workers is retained by the capitalist class ([Marx 2008](#), 226-233). Capitalism rests on a system of wage labour, in which workers are forced to sell their labour to capitalists as they otherwise lack access to the means of production ([Marx 2008](#), 181-191). The product of the workers’ labour belongs to the capitalists who sell it to make a profit. The wage the workers are paid does, however, not correspond to the value of the product of their labour, but

can be significantly less, the only strict condition being that it must be enough to reproduce their labour power by keeping the worker alive to work another day. Since the workers are generally able to produce more than that bare necessity, they produce what Marx calls surplus value. Exploitation describes the capitalist class's appropriation of the surplus value produced by the working class or part thereof (Marx 2008, 226-233).

The following series of examples is intended to give credence to the notion that this process of exploitation deserves moral condemnation. This is not intended as a formal argument and will perhaps not convince the reader. But it may nonetheless give an insight into the intuitive objection shared by many socialist to the kind of exploitation that Marx considered to take place under capitalism. First it should be noted that exploitation is not unique to the capitalist mode of production. Any historical class-based system depends on the exploitation of subordinate classes. So, we will begin by considering a feudal system in which serfs are forced to work the fields and must hand over part of their harvest to the feudal lord who owns the land. Or alternatively, the peasants are allowed to use some part of the land to grow food for themselves and have to work the rest of the land for the benefit of the lord. Most people will likely join socialists in condemning such a system, though some liberals or libertarians might argue that what is reprehensible about such a feudal society is that the serfs are not free and thus have no choice in whether they want to work the fields for the feudal lord or not, rather than that they are exploited.

So, let us assume instead that the serfs are set free and the lord permits them to go elsewhere if they choose to. But since the now freed peasants still need to eat, they must grow food somewhere. If there is no land available for them to claim as their own, they will be forced to continue to work the fields of the land owner under pretty much the same conditions. Perhaps some of them will choose to work for a different lord instead, but all in all not much is likely to change for them. Perhaps instead of retaining part of the harvest they will be paid a wage, which they then have to use to buy back the harvest from their or some other landowner. The share of the product that they get to consume might or might not go up, but the general principle that the landowning class retains part of the product of the labour of the peasantry remains unchanged. Finally, in a modern capitalist society, the means of production are not limited to land, but also include expensive machinery which most workers cannot afford. Much like the peasants in our previous examples they are forced to sell their labour power in exchange for a wage that is worth only part of what they have produced. What has changed is primarily what constitutes the means of production held by the owning class.

All of the societies described above are exploitative according to Marxist analysis. The owning class (first land owners, then owners of various kinds of means of production) can appropriate surplus product from the peasant/working class. Anyone that agrees that the feudal society in the first example is reprehensible will have to explain at what point in the step by step transformation we have considered this ceases being the case. The Marxist theory

of exploitation suggests that there is little difference between these examples. That the serfs are set free changes very little for them if they continue to be forced to work under the same conditions by the threat of starvation. As Marx puts it:

[W]hether a man [sic] works three days of the week for himself on his own field and three days for nothing on the estate of his lord, or whether he works in the factory or the workshop six hours daily for himself and six for his employer, comes to the same. (Marx 2009, Section 9)

Whether they are allowed to retain part of their harvest or are paid a wage does not significantly affect the material well-being of the peasants or workers. Any of the changes we have discussed here thus seem to be insignificant for an evaluation of the relationship between lords and peasants, or capitalists and workers.

The twentieth century has seen the rise of a welfare state funded by a system of progressive taxation in many western countries which is often justified by a recognition that unhampered capitalism is in fact ruthlessly exploitative. This has undoubtedly led to the relief of immense human suffering by ensuring access to healthcare, education and poverty relief. But let us consider such a system in the feudal context. The peasants get to retain part of their harvest for themselves, as before, and the rest is handed over to the feudal lord. Let us say that 60% of the harvest is eaten by the peasants and 40% passed to the lord. The king has now, out of an unlikely generosity, declared a tax on grain received by the lords and for some reason the lords have been unable to resist this tax. Half of the 40% is given to the king who passes it back to the struggling peasants or perhaps he uses it to pay healers who treat the peasants when they are in ill health. There is no doubt that the peasants would immensely benefit from such a system, but still 20% of their harvest is going to the feudal lord. Whether 40% or 20% of the harvest is retained by the lords seems relatively insignificant for a moral evaluation of the feudal relationship between aristocracy and peasantry. If it is wrong for the feudal lords to claim 40% of the harvest, then surely it must also be wrong for them to claim 20%. There is, after all, no fundamental difference between the first 20% they take, and what they might take beyond that. In the same way, the modern welfare state might improve the living conditions of workers under capitalism. But it does not completely get rid of the fundamental problem of capitalist society, which is, as with feudalism, exploitation.

Having given some intuitive plausibility to the notion that capitalist exploitation ought to be condemned, we will now consider what is at stake in a more systematic study of the relationship of Marxist theory to the question of justice. Did Marx think that capitalism and exploitation were unjust? And what then constitutes justice for Marx? An obvious interpretation would be that a society is just if it is not based on exploitation. But while it is clear that Marx condemned capitalist exploitation in some sense, there has been significant debate about whether he condemned it as unjust. In my reconstruction of some of the key arguments

in the debate I will closely follow the overview provided by Geras (1985, 1992). The two main positions made out by Geras are a) that Marx condemned capitalist exploitation as an unjust violation of worker's entitlements and b) that Marx opposed normative criteria such as justice altogether. The welfarist account I will argue for in the next section can be seen as an alternative to both of these perspectives.

The case against Marx considering capitalist exploitation unjust could not be more straightforward. He directly says that it is not (Geras 1985, 49). That the commodity labour power produces more value than is paid for it 'is good luck for the buyer, but by no means an injustice towards the seller' (Marx 2008, 559). The worker cannot lay claim to the product of his labour because '[a]s soon as his labour actually begins, it has already ceased to belong to him' (Marx 2008, 559). According to Marx the selling of labour power is both voluntary and equal in that the full value of the labour power (i.e. the value needed to reproduce it) is paid to the worker.

Marx's objection to seeing exploitation as unjust is grounded in his materialist conception of history. In a passage quoted by Geras, Marx speaks of

a whole gang of half-mature students and super-wise diplomaed doctors who want to give socialism a 'higher, idealistic' orientation, that is to say, to replace its materialistic basis (which demands serious objective study from anyone who tries to use it) by modern mythology with its goddesses of justice, Liberty, Equality and Fraternity. (Marx quoted in Geras 1985, 50)

Marx argues that any notion of justice is necessarily tied to the economic relations from which it emerges and for which it was conceptualised (Geras 1985, 51). The bourgeoisie has, according to Marx, every right to consider the present-day distribution fair. In a rhetorical question Marx asks:

Do not the bourgeois assert that the present-day distribution is "fair"? And is it not, in fact, the only fair distribution on the basis of the present-day mode of production? (Marx 1999a, Part 1)

Marx goes on to suggest that such a conception of justice or fairness necessarily follows from economic conditions and that no alternative notion of justice could give rise to alternative economic relations by asking:

Are economic relations regulated by legal conceptions or do not, on the contrary, legal relations arise from economic ones? (Marx 1999a, Part 1)

According to this take on Marx, he had what one could refer to as a legal positivist understanding of justice. A distribution is just if it is in correspondence with the legal relations of the time. These legal relations or conceptions of justice are specific to certain stages in historical development and are a direct result of its economic conditions. There is thus no trans-historical standard of justice that could be used to condemn capitalism as unjust, which Geras (1985, 51) suggests would also make Marx a moral relativist: not in the sense that morality is subjective, but in the sense that it is specific to certain historical societies.

Proponents of the view that Marx believed in justice can point to his use of morally loaded terms like theft and robbery when referring to the appropriation of surplus value by the capitalist class (Geras 1985, 56). These terms suggest that exploitation constitutes a violation of the ownership rights of workers, which could be called injustice. According to this view, the absence of injustice under capitalist relations is merely an illusion and the following passage has been quoted in support of this interpretation (Geras 1985, 55):

The exchange of equivalents, which *seemed* to be the original operation, is now turned around in such a way that there is only an *apparent* exchange. [...] The relation of exchange between capitalist and worker becomes a mere *semblance* belonging only to the process of circulation, it becomes a mere form, which is alien to the content of the transaction itself, and merely *mystifies* it. (Marx 2008, 609)

The equality of values in exchange is a superficial equality which serves to veil the underlying inequality of exploitation. This is an explanation of ideology that is typical of Marx; ideology arises from the way that we are confronted with economic relations in our everyday life, in this case as voluntary and equal exchange.

The pro-justice view can account for Marx's comments on the ties between economic relations and justice by interpreting these as a case of what Geras refers to as moral realism (Geras 1985, 58). What rights can actually be enforced is 'constrained by the economic structure and resources of the given society', but this does not mean that 'standards to be used in evaluating or assessing a society must necessarily also be constrained by the same economic configuration' (Geras 1985, 58). Perhaps an economic configuration should be criticised precisely because it does not allow for the securing of rights which people ought to have.

Geras (1985, 1992), in his own view about Marx and justice, argues that we should accept that Marx is simply not coherent on the matter. He points out that Marx did not value ethics the same way that he valued the study of history or economics, which explains his lack of conceptual clarity on the matter (Geras 1985, 62). In regard to the equality of exchange, Geras says that 'Marx has it both ways' (Geras 1985, 63). In *Capital* (Marx 2008, 181-191) he makes it quite clear that the capitalist pays the value of the labour power, which makes

the capitalist the owner of any product produced thereby. In a different sense, however, the labour is still that of the worker. It is his ‘personal effort’ (Geras 1985, 63), which creates the value of the product. What Marx is ambiguous or even inconsistent about is which of these perspectives on the production process is normatively relevant (Geras 1985, 63). Geras proposes to acknowledge this ambiguity or paradox by understanding that ‘Marx did think capitalism was unjust but he did not think he thought so’ (Geras 1985, 70). Perhaps a simpler way to put this is that Marx condemned capitalism on grounds of what should be called justice, but he did not consider these grounds to be a question of justice and thus did not call capitalism unjust.

3.2 A Welfarist Reading of Marx

The debate as reconstructed by Geras (1985, 1992) focuses primarily on whether Marx thought exploitation was an unjust violation of worker’s entitlements to the value produced by their labour. This focus is much too narrow and ignores the possibility that capitalism ought to be condemned for reasons which have nothing to do with a violation of rights or entitlements. As I outlined above, the theory of exploitation is certainly influenced by the Lockean theory of property rights (Shapiro 1991; Locke 2008, 11). But understanding the theory of exploitation as a normative theory of justice gives way more credence to bourgeois notions of property rights than is sensible for a socialist theory. Locke was concerned with providing a justification for private ownership of the material world, something which socialists staunchly object to. So, while Locke certainly helped Marx to conceptualise exploitation, there is a limit to the usefulness of Lockean ideas in a socialist framework.

Marx’s comments on socialist distribution allow for an alternative interpretation of what his underlying concern was. If we want to understand Marx’s ultimate motivation, we should perhaps look towards his description of the higher stage of communism, the most complete form of a socialist society for Marx. In the higher stage, goods and burdens are distributed according to the needs principle: ‘From each according to his [sic] abilities, to each according to his [sic] needs’ (Marx 1999a, Part 1). The needs principle demonstrates Marx’s considerable concern for the satisfaction of human needs. Indeed, he argues that the lower stage of communism insufficiently takes into account differences in individual needs (Marx 1999a, Part 1). I will argue in the next chapter that Marx’s division into two stages of communism is flawed, but it nonetheless shows us that any potential rights violation due to exploitation was not Marx’s main concern, or at least not his only concern. Both stages of communism have, after all, done away with class exploitation. Marx thus had a reason other than exploitation for arguing the higher stage should at some point replace the lower stage, and this reason seems to have to do with human needs.

A normative reading of the theory of exploitation leads to a rights-based theory of justice, in

which workers are entitled to the value produced by their labour. Any individual or institution that violates this right by denying workers the value of the product of their labour is to be condemned. A focus on Marx's concern for needs satisfaction instead suggests a welfarist and consequentialist approach. Capitalism is not to be condemned because it violates worker's entitlements, but because it fails to adequately satisfy their needs. It is the consequences for workers lives that speak against capitalism. The kinds of consequences that are relevant relate to human welfare, where welfare is understood in terms of the satisfaction of human needs. The concern for need satisfaction allows us to place Marx closer to the utilitarianism of the likes of [Bentham \(1970\)](#) or [Mill \(2014\)](#) than to [Locke \(2008\)](#). While a strictly utilitarian interpretation of Marx, as proposed by [Allen \(1973\)](#), is likely not tenable, Marx can certainly be understood as advocating for welfare in some broader sense ([Neurath 1973a](#), 289; [Miller 1981](#)).

There are further (implicit) parallels that can be drawn between Marx and utilitarian thought. Marx was concerned that the 'accumulation of wealth on one pole, is at the same time accumulation of misery, toil, slavery, ignorance, brutality and moral degradation on the opposite pole' ([Marx 2008](#), 675). The concern for the effects of the unequal distribution of wealth on the well-being of the poor is shared by some utilitarians, most notably [Singer \(1972\)](#). Singers argument for redistribution rests on two core assumptions of classical utilitarianism: that some needs (or preferences or prevention of suffering) are more urgent than others and that we can make such a comparison of moral significance between the needs of distinct individuals (interpersonal comparison of utility). More specifically, Singer argues that the suffering from 'lack of food, shelter and medical care' ([Singer 1972](#), 231) has a higher moral significance than what would have to be sacrificed by wealthier people to prevent that suffering through redistribution. It should be noted that the second of the assumptions of classical utilitarianism (interpersonal comparison of utility), has been explicitly rejected by the economists who adopted parts of utility theory into the neoclassical framework ([Robbins 2007](#), 120-141). That some needs are more urgent than others is, however, readily accepted by neoclassical economics and is at the basis of the law of diminishing marginal utility ([Varoufakis 1998](#), 53). Diminishing marginal utility is also implied by Singer to support the moral case for ending poverty through (voluntary) redistribution.

While Marx did not explicitly endorse either of these two principles of classical utilitarianism, he did not appear to reject them either. They are necessary in order to justify why ending the toil and suffering of the working class is more important than the luxury benefits gained by the capitalist class. Only when ending the suffering of the lower classes is more significant than the maintenance of the extravagances of bourgeois life can the demand for a revolutionary overthrow of capitalism be justified. A rational reconstruction of his view must thus include some sort of ordering of needs and interpersonal comparison. This is not based on a textual analysis of Marx's works, but on a consideration of what premises about welfare would allow us to condemn the inequality of capitalism. So while it would be a stretch to claim Marx

explicitly endorsed interpersonal comparison and need ordering, we can form a welfarist critique of capitalist inequality that is recognizably Marxist on these two premises. The next chapter will elaborate on this line of thought when considering the question of distribution under socialism.

An earlier welfarist account of Marx was given by Neurath (1973a), who describes Marxism as a ‘kind of social Epicureanism’ (Neurath 1973a, 289). Neurath emphasises how Marx was influenced by Epicurus, who was together with Democritus the subject of his doctoral dissertation (Marx 1975). The ethics of Epicurus with its focus on pleasure and earthly happiness can be seen as a precursor to the utilitarian philosophy of Bentham (Birnbacher 2013, 253-259). While his claim of an Epicurean influence on Marx might well be an overstatement, Neurath sees an Epicurean worldview as a natural ally of the working class in their struggle against capitalism. Thus,

[m]any adherents of the bourgeois-capitalist order reject such an attitude; whether consciously or not, they do not want to bother about the happiness of the masses, and being themselves materially safe, they turn to thinkers who declare earthly happiness to be nothing; they are enthusiastic about Plato the aristocrat, about the ‘sublime’ ideas, mysticism, the high concept of duty in Kantianism, about ‘idealism’ and liberation from things earthly; whereas they find the Epicureans’ striving for happiness vulgar. (Neurath 1973a, 288)

At the same time, Neurath credits capitalism with giving new ‘room to Epicureanism’ (Neurath 1973a, 289), which might also explain that the rise of capitalism was closely followed by the conceptualisation of utilitarianism:

Capitalism completely dissolves the inner and outer bonds of the Middle Ages and once more gives room to Epicureanism. Striving after happiness is recognised as something natural; freedom is won through struggle, even the freedom to exploit. Sixteen hour working days, female and child labour, unemployment. Sorrow upon sorrow. No God helps. Real powers that bring salvation - where are they? (Neurath 1973a, 289)

Neurath closely ties the focus on earthly happiness to the materialist and anti-religious philosophy of Epicurus. In modern times, Marx and Engels incorporated these elements into a world view that could be used by the working class to fight for their happiness:

The enslaved proletariat unites. It helps itself and fights for its happiness, both bodily and mental. Marx and Engels create a sphere of thought for this fight. They observe: the living standards of the proletariat, its happiness or misery are conditioned by the capitalist order of life. (Neurath 1973a, 289)

Having realised that the misery of the working class is a result of fundamental economic relations, Marx and Engels advocate a radical overthrow of those relations:

Help can come only through a transformation of the order, through a historical turning over. Thus, Marxism is a kind of social Epicureanism. It asks about the happiness of men [sic], of whole classes, of humanity. It sees that this depends on social, not on individual action. (Neurath 1973a, 289)

Such a transformation of the economy cannot be achieved by individual action, but only through collective struggle. In this way, Marx's approach differs significantly from that of Singer (1972) discussed earlier. Singer's writing on poverty concerns the individual charitable actions of the wealthy. He attempts to show that the wealthy have a moral obligation to give to charity (Singer 1972). Marx would likely have frowned upon attempts to appeal to the individual moral sense of members of the upper classes. Instead of focusing on the actions of individuals, Marx was interested in a systemic analysis of economics. Consequently, the toil of the working class was not to be ended through individual charitable action but through class struggle leading to the overthrow of the economic system of capitalism. However, the analysis of social institutions and economic institutions, rather than individual actions, is not at all alien to utilitarianism as a whole, as Bentham was just as concerned with reforming government (Bentham 1970).

Marx recognised these political ambitions of the classical utilitarians, but criticised them for not questioning bourgeois economic relations:

The whole criticism of the existing world by the utility theory was consequently restricted within a narrow range. Remaining within the confines of bourgeois conditions, it could criticise only those relations which had been handed down from a past epoch and were an obstacle to the development of the bourgeoisie. Hence, although the utility theory does expound the connection of all existing relations with economic relations, it does so only in a restricted way. (Marx 2019, Chapter 2)

Because of their unquestioned acceptance of the fundamental economic relations of capitalism, they could only attempt to improve it, but they failed to realise that it was capitalism itself that needed to be overcome. Brenkert (1981, 196) sees this passage as clear evidence that Marx was not a utilitarian. But unquestioning support for the fundamental economic principles of capitalism is at best a contingent position of historical utilitarians. It is not a fundamental tenet of utilitarian moral philosophy.

A utilitarian reading of Marx has also been objected to (Brenkert 1981, 194-195; Green 1983, 433-437) on the basis that Marx explicitly speaks out against Bentham's utility principle. In

a footnote to *Capital*, he argues that the principle is unhelpful for understanding the actions of humans or even animals:

If one, for example, wants to know what is useful to a dog, one has to study the nature of the dog. The nature of the dog cannot be construed from the “utility principle”. (Marx 2008, 637).

Two important notes must be made on this comment by Marx. The first is that there are two aspects to Bentham’s utility principle and Marx is only referring to one. Utilitarianism as a moral philosophy holds that individual actions and social institutions ought to be set up in a way that maximises utility. This is not what Marx is responding to here. Instead he is responding to Bentham’s assumption that humans and animals do in fact act in ways that increase their own utility (Bentham 1970, 11). This is a descriptive statement, which can be understood as independent from the normative claims of utilitarianism, although Bentham frequently conflates the two. Furthermore, it should be noted that Marx does not reject Bentham’s utility principle. He rather considers it trivial and unoriginal. His point is not that usefulness to the dog is irrelevant, but rather that discovering what is useful to the dog requires a study of the nature of the dog. The utility principle alone tells us nothing about the dog.

Marx’s claim of lack of substance might be warranted for utility theory as an empirical-psychological theory of behaviour. Given the stark contrast between the consequentialism of Bentham and the competing approach of deontological ethics, it is, however, not accurate to describe utilitarianism as trivial in the realm of ethics. There is a clear distinction between deontological approaches to ethics which allow or disallow certain kinds of actions and consequentialist approaches which evaluate actions and institutions based on their consequences (Birnbacher 2013, 113-240). Far from being unoriginal, Bentham has substantially contributed to the advancement of the latter approach (Crimmins 2020, Section 3).

There is, however, one real point of contention between Marx and a fundamental assumption of utilitarianism. Utilitarianism generally assumes the existence of cardinal utility, which also distinguishes Utilitarians from their Epicurean precursors. Marx assumed the existence of such a cardinal measure only for labour value and exchange value. What he calls use value is for him ‘primarily of varying quality’ (Marx 2008, 52). Usefulness is thus not measurable on some cardinal scale and Marx called the ‘merging [of] all the manifold relationships of people in the one relation of usefulness’ an ‘absurdity’ (Marx 2019, Chapter 3). Neurath (1973b), too, explicitly rejects the idea of cardinal utility.

This thus leaves us with an interpretation of Marx that is in line with utilitarianism on important issues such as interpersonal comparison and ordering of needs but differs on the question of whether happiness or usefulness can be expressed on a single, cardinal scale. These are sufficient to argue that the needs of members of the working class for a decent standard of

living are more important than the luxury consumption of the bourgeoisie. We do not need to contend that this is measurable on a cardinal scale, or even comes down to some single measure. All that has to be accepted is that a state of affairs in which the more basic needs of the working class are met is more desirable than one where workers are deprived of some of those needs in favour of bourgeois luxury consumption. The assumptions of interpersonal comparison and some form of ordering of needs are sufficient for this.

The welfarist account differs significantly from the normative interpretation of the theory of exploitation discussed in the previous section. It does not recognize any natural rights or entitlements of workers. Such ‘legal relations arise from economic ones’ (Marx 2019, Chapter 1) and are not given by some more general natural law. Instead, ‘appropriate rights are to be chosen by assessing their consequences for the lives of people governed by them’ (Miller 1981, 333). Whether or not people should be given certain rights by the law should thus depend on the consequences of such a law in terms of welfare.

We can reinterpret Marx’s comments on justice and right in this light. When Marx writes that no injustice to the worker is being committed through wage labour, because ‘[a]s soon as his [sic] labour actually begins, it has already ceased to belong to him [sic]’ (Marx 2008, 559), he means that there is no violation of the worker’s ownership rights. The system of wage labour still does significant harm to the individual worker and to the proletariat as a class and can be objected to on that basis. Exploitation is not to be objected to because it is a violation of worker’s entitlements and the welfarist account does not regard (lack of) exploitation as the primary moral standard by which to judge social institutions or modes of production.

Instead, exploitation can be seen as the mechanism by which subordinate classes of people are systematically deprived of the ability to adequately satisfy their needs. It is through exploitation that the ruling class is able to accumulate ‘wealth on one pole’, in the process causing the ‘accumulation of misery, toil, slavery, ignorance, brutality and moral degradation on the opposite pole’ (Marx 2008, 675). Perhaps most importantly, exploitation deprives the working class of their time, time that is needed to freely develop and satisfy their needs. Freedom from exploitation is thus not an intrinsic virtue, but an extrinsic one. It is to be valued not as an end in itself, but because it leads to a fuller development and satisfaction of needs.

The interpretation that Marx simply rejected natural law accounts of morality also satisfies the concern regarding moral relativism expressed by Geras (1985, 51). Marx does not reject any criterion by which to make a trans-historical evaluation of social institutions and modes of production. Legal relations are specific to certain historical societies and modes of production and cannot be derived from a more general concept of right. The criterion of welfare on the other hand can be applied more generally and can thus be used to criticise the capitalist mode of production. It can also be used to contemplate the social institutions and mechanisms of distribution of a socialist society and that is what we will consider in the next chapter.

Any complex thinker like Marx will inevitably allow for more than one interpretation and so no claim is made on this being the only viable interpretation, or even the interpretation closest to any stage of Marx's evolving thoughts. It does, however, give us a clear normative basis on which to discuss the question of distribution under socialism in more practical terms in the next chapter.

3.3 Socialism as Injustice: the Deontological Objection

Before considering distribution under socialism on welfarist terms, I will consider the deontological objection to socialism by [Nozick \(1974, 162-164\)](#) which claims that individuals do have moral (property) rights which are necessarily violated by socialism. If Nozick is right, any consideration of welfare is constrained by a strict obligation not to violate these rights. This would make socialism impermissible, independently of any potential benefits in terms of welfare.

Nozick's argument is considered for two independent reasons. First of all, if his argument against socialism is conclusive, socialism would be objectionable for moral reasons. This would put into question the central claim of this thesis that socialism should be given serious consideration as an alternative form of economic organisation. The second reason is that Nozick might only be partially correct by successfully establishing the existence of property rights which should not be violated, while failing to show that socialism must necessarily violate them. This would, however, imply that distribution under socialism would be severely constrained by these rights. Any distributional mechanism for socialism would thus have to be formulated under this constraint. However, I will argue that Nozick is unsuccessful in establishing such property rights and his arguments will thus not have to concern us any further in the following chapters.

That socialism violates individuals' property rights is a common objection to socialism, and Nozick's historical entitlement theory of justice ([Nozick 1974](#)) is perhaps the most influential systematic approach that takes this route. It is not capitalism that is unjust, Nozick contends, but the violation of individual property rights under socialism and also under various redistributive tax regimes. This objection differs significantly from objections that focus on the supposed economic consequences of the introduction of socialism, such as the calculation argument ([von Mises 1920, 1922](#)) that will be considered in Chapter 6.

Nozick argues that consequentialist approaches like utilitarianism, which only consider outcomes, have 'too narrow [a] conception of good' ([Nozick 1974, 28](#)) and that individual rights must also be paid attention to. Nozick draws on the natural law tradition. Rights are not for governments to give and take away. Instead they exist prior to and independently of the state

as normative claims that ought to be respected by any state that humans might create. Not only do rights have to be considered, Nozick suggests a specific way in which this ought to be done: as side constraints (Nozick 1974, 29). This differs from what he calls a ‘utilitarianism of rights’ (Nozick 1974, 28), in that it is not permissible for the state or anyone else to violate an individual’s rights in order to prevent some greater violation of rights. Instead, rights constitute a strict limitation on the kinds of actions that are permissible:

In contrast to incorporating rights into the end state to be achieved, one might place them as side constraints upon the actions to be done: don’t violate constraints C. (Nozick 1974, 29)

Nozick’s approach to ethics is thus clearly a deontological one, in that certain kinds of actions (those that violate rights) are impermissible independently of their consequences. The influence of Kant becomes apparent in his citation of the second formulation of the categorical imperative as a motivation for treating rights as side constraints:

Side constraints upon actions reflect the underlying Kantian principle that individuals are ends and not merely means; they may not be sacrificed or used for the achieving of other ends without their consent. (Nozick 1974, 30-31)

One kind of right that constitutes such a side constraint is property right. Property rights are of significance to Nozick as they form the basis of his historical entitlement theory of justice. What distinguishes this approach from other conceptions of justice is that whether a distribution is just depends solely on whether it has come about through a just process (Nozick 1974, 153-160). More specifically it must have come about through a combination of just acquisition and just transfer. Nozick summarises his theory of justice as follows:

1. A person who acquires a holding in accordance with the principle of justice in acquisition is entitled to that holding.
2. A person who acquires a holding in accordance with the principle of justice in transfer, from someone else entitled to the holding, is entitled to the holding.
3. No one is entitled to a holding except by (repeated) applications of 1 and 2. The complete principle of distributive justice would say simply that a distribution is just if everyone is entitled to the holdings they possess under the distribution. (Nozick 1974, 151)

A full account of the entitlement theory of justice is only given once we have specified what the principles of justice in acquisition and transfer are. How exactly does one come to be entitled to a holding through either acquisition or transfer? For transfer the matter is relatively simple. The right to transfer property rights is already entailed in the holding of these property

rights, because they are what G. A. Cohen refers to as property rights in the ‘full liberal sense’ (Cohen 1995, 72). This includes the ‘unfettered rights to transfer and bequest’ (Cohen 1995, 73). Thus, a just transfer is simply any ‘voluntary exchange’ or ‘gift’ (Cohen 1995, 150). The question of justice in transfer is entirely dependent on the original acquisition of such far-reaching rights to property and ‘no separate question about its transfer can arise’ (Cohen 1995, 72-73). But the question of acquisition becomes all the more troubling for Nozick, as acquisition has to lead to property rights in the full liberal sense, including the unrestricted right to transfer. It is thus crucial that Nozick give a convincing explanation of how one acquires property rights over something previously unheld.

Before we consider the principle of justice in acquisition, let us consider how Nozick might argue that socialism violates property rights. Much of what he says on the violation of property rights concerns ‘patterned’ distributional principles more generally, but where he does not explicitly do so himself, we can easily infer how these arguments might apply to Marxist socialism more specifically. Nozick begins his argument by observing that the right to transfer property freely upsets distribution according to some pattern such as equality (Nozick 1974, 160-164).

He considers the case of professional Basketball player Wilt Chamberlain. Fans of Wilt Chamberlain are willing to pay some of their money to see him play. He might thus be able to find a team which is willing to give him a contract that awards him 25 cents from the price of each ticket sold. Because Chamberlain has so many fans, this results in him becoming significantly richer than most people, thus upsetting the pattern of equal distribution.

In order to implement an equal distribution (or some other pattern) it is thus necessary to somehow restrict this transfer of money, thus limiting the right to transfer. Patterned distributional principles thus imply more limited property rights than Nozick’s entitlement theory: ‘they do not give the right to choose what to do with what one has’ (Nozick 1974, 167). Another way to attempt to maintain a pattern is through redistribution, which requires some form of taxation. But taxing Wilt Chamberlain would involve taking money from him to which he has the right: ‘From the point of view of an entitlement theory, redistribution is a serious matter indeed, involving, as it does, the violation of people’s rights’ (Nozick 1974, 168). Either way, maintaining a pattern involves, according to Nozick, serious limitations or violations of property rights.

In the same context Nozick discusses how private property in the means of productions would arise from a distribution D1 in a socialist society that does not restrict transfer:

[S]mall factories would spring up in a socialist society, unless forbidden. I melt down some of my personal possessions (under D1) and build a machine out of the material. I offer you, and others, a philosophy lecture once a week in exchange for you cranking the handle on my machine, whose products I exchange for yet

other things, and so on. (The raw materials used by the machine are given to me by others who possess them under D1, in exchange for hearing lectures.) Each person might participate to gain things over and above their allotment under D1. Some persons even might want to leave their job in socialist industry and work full time in this private sector. [...] [P]rivate property even in means of production would occur in a socialist society that did not forbid people to use as they wished some of the resources they are given under the socialist distribution D1. (Nozick 1974, 162-163)

The possibility of a private sector arising under socialism necessitates legal restrictions on private business practices: ‘The socialist society would have to forbid capitalist acts between consenting adults’ (Nozick 1974, 163). Indeed real-existing socialist countries have often had strict limitations on private economic activity, though they are not alone in this and many capitalist countries also heavily regulate and restrict certain business practices. The point which Nozick seems to want to make is that these restrictions, which are necessary to maintain socialism, are illegitimate violations of property rights. Property rights entail the right to do with that property as one likes, including transfer, and thus any restriction of private business violates the rights of property holders.

But for there to be any violation of rights, individuals must in fact have full property rights to their belongings. In his account of how a private sector might arise under socialism, Nozick assumes that he has the full rights to the personal belongings he melts down to build a machine and it is thus within his freedom to do so. Since we know nothing about how he came to have those belongings, there is no way to tell if this is the case and whether there is any violation of natural rights if socialist law were to forbid him from using these belongings for “capitalist acts”. We must thus ask ourselves whether individuals would actually have full property rights to their personal belongings under socialism, a consideration that Nozick fails to make in his example.

As we have seen, there are, according to Nozick, two ways of gaining property rights: acquisition of previously unheld items or voluntary transfer of property rights from one individual to another. Absent from this is a consideration of things that are held by the public, as most things would be under socialism. But let us assume that it is in principle possible for private property rights to emerge for something previously held by the public by having the socialist society relinquish public ownership and award private property rights to an individual. A socialist society could not give up public ownership of factories and machines in this way without ceasing to be socialist, but it would have to have some sort of mechanism for passing part of the social product of consumer goods on to individuals, for example through some form of token system. Individuals are given a certain amount of tokens and can redeem these for part of the social product (see Chapters 4 and 5).

This way items produced socially might become Nozick’s personal belongings. But society

would not have to award individuals the full property rights to those items which might give Nozick the right to melt some of them down to build his machine. It would be completely sufficient for society to award the right to use those items solely for Nozick's personal consumption. Individuals thus do not have property rights in the Nozickian sense to their share of the social product and Nozick's rights are not violated when he is forbidden from using those items to start a production workshop.

Nozick suggests that such restrictions constitute a limitation of freedom (Nozick 1974, 163-164). But even according to Nozick's own theory, a limitation of what one might do with certain items is only illegitimate if one has the property rights to them. In fact, he advocates quite strict limitations of what one can do with certain items himself, namely with those items rightfully claimed by someone else. I am not allowed to take and use Nozick's personal belongings without his permission. Even in a socialist society this would presumably be forbidden. But such a restriction of my freedom might be perfectly sensible and not violate my rights, as I do not have property rights to Nozick's belongings. In the same way a restriction of how Nozick can use items out of social production that are provided to him is not an illegitimate restriction of his freedom, since such a provision does not have to entail the awarding of full property rights.

We must also consider the possibility that an individual could come to acquire property rights to something previously unheld under socialism. For now, I will simply refer to the later discussion of the principle of justice in acquisition, which we have not explored in full yet. However, I am inclined to say that nothing could be unheld, as under socialism public ownership would be the default for all land, natural resources and so on. There is also the possibility that someone has rightfully acquired something before the introduction of socialism. Or perhaps they have gained it through transfer from someone who has acquired it at that time. Again, the existence of such property rights depends largely on whether there is a plausible theory of acquisition, which I will return to shortly.

Socialists have often advocated for some form of expropriation of private property, effectively disregarding any previously acquired property rights. An example for such a policy is the expropriation of land owners in the aftermath of the October Revolution (Giacché 2018, 17). But expropriation is curiously absent from Nozick's discussion of socialism. Perhaps this is because such expropriation is so obvious a violation of property rights for Nozick, that it does not even warrant discussion.

Since the ban on 'capitalist acts' is only a violation when people actually have Nozickian property rights to their belonging, we might instead consider the introduction of socialism to imply the denial of (some) previously held property rights. From this perspective there is no perpetual violation of individual rights to do with their personal belonging as they like, since this right is not recognised. Instead it is the introduction of socialism with its negation

of previously held titles, including and up to full expropriation, that might constitute a great injustice. Whether this change in property relations actually constitutes a violation of rights depends, however, on whether there actually is a way for individuals to come to hold (full) property rights in the first place. It is thus time that we consider the principle of acquisition in detail.

As we have seen, Nozick's theory of justice depends entirely on the principle of justice in acquisition. It is thus surprising that Nozick proclaims that 'we shall not formulate [it] here' (Nozick 1974, 150) and as Jonathan Wolff remarks 'it is not formulated anywhere else by Nozick either' (Wolff 1991, Chapter 4, Locke on Property). Not only does Nozick not argue for a process of acquisition resulting in actual property rights, he does not even make clear what that process is supposed to be. This makes the task for critics of Nozick relatively easy. All that must be done is to point to the lack of a principle of justice in acquisition and proclaim Nozick to have failed. Nozick's theory is nothing but a curious thought experiment: What if there was a process by which people could come to gain unfettered private property rights that constitute strict side-constraints on permissible actions by individuals or the state? Perhaps this really is all that we should take Nozick's theory to be, even if his intention was clearly more ambitious. But we can look for clues on what a principle of justice in acquisition might look like in Nozick's commentary on Locke.

Locke, too, was concerned with how things could become private property. A fundamental difference is that Nozick views the world as originally unowned, while Locke assumes that prior to the establishment of private property it is owned in common (Wolff 1991, Chapter 4). Locke's conception of common ownership differs from the socialist conception of public ownership in that common holdings are not administrated in common but can simply be accessed by all. Parts of the world can become private property through the performance of labour on it. This is because 'labour is unquestionably the property of the labourer' and so 'no other man [sic] can have a right to anything the labour is joined to' (Locke 2008, 11). Nozick points out several problems with Locke's theory. Perhaps the gravest of these problems is that there is no reason to assume that one becomes the owner of something by mixing it with something one already owns. Nozick illustrates this with an example:

If I own a can of tomato juice and spill it in the sea so that its molecules (made radioactive, so I can check this) mingle evenly throughout the sea, do I thereby come to own the sea, or have I foolishly dissipated my tomato juice? (Nozick 1974, 175)

Nozick also considers that one only owns the part of the value of an object that was added through one's labour, but quickly dismisses this because he does not believe there to be an adequate measure of the value added through labour (Nozick 1974, 175). The notion would also be problematic for Nozick, as private property in natural resources like land could not

be justified.

For Locke, any acquisition of private property is subject to the limitation that there must be ‘enough, and as good, left in common for others’ (Locke 2008, 11). Nozick accepts a form of this Lockean proviso as a necessary condition for acquisition:

[A]ny adequate theory of justice in acquisition will contain a proviso similar to the weaker of the ones we have attributed to Locke. (Nozick 1974, 178)

The stronger interpretation of the proviso would claim that appropriation is illegitimate if it means there is less available for others to appropriate, or less than they might realistically be able to appropriate for themselves. This stronger formulation does not have to be satisfied according to Nozick.

The weaker interpretation of Locke’s proviso allows there to be loss of opportunity for others to ‘improve [their] situation by a particular appropriation or any one’ (Nozick 1974, 176). It does, however, not allow the appropriation to inflict upon another a loss ‘by no longer being able to use freely (without appropriation) what he previously could’ (Nozick 1974, 176). Appropriation may thus harm others only in the sense that they can no longer appropriate something themselves. But they must still be able to access everything that they need. It is this weaker interpretation of the proviso that Nozick accepts. He claims that ‘[i]t is arguable that no one legitimately can complain if the weaker provision is satisfied’ (Nozick 1974, 176).

Wolff (1991, Chapter 4) identifies three possible interpretations of the significance of Nozick’s comments on Locke for his overall theory. One of those interpretations is that Nozick completely rejects Locke’s theory of acquisition and only accepts the proviso as a necessary condition of appropriation. He offers no sufficient condition for acquisition. Alternatively, he suggests that there is some modified version of Locke’s labour-mixing account that is acceptable but does not specify what this modified version might be. According to both of these interpretations Nozick’s theory has a significant gap, as the principle of justice in acquisition is not specified and no argument is given for why it should lead to full property rights.

However, this short-coming seems to be very much in line with Nozick’s own admissions. The consequence of this is that Nozick is not successful in establishing the existence of property rights and we thus do not have to consider any side-constraints on distribution. Individuals might have property rights in some weaker sense, which are perhaps merely legal rights within current jurisdictions. But they do not have rights in Nozick’s sense, which means that they would constitute strict side-constraints on permissible actions by both individuals and the state.

The final possible interpretation identified by Wolff (1991, Chapter 4) is that the Lockean

proviso is not just a necessary condition for acquisition, but also a sufficient one. Individuals are free to appropriate unheld items and gain full property rights over them, as long as the proviso is not violated. This requires us to take a closer look at the proviso.

In response to the question whether there are not people left worse off by the appropriation of private property, Nozick responds with an explanation of supposed positive economic effects of a private property regime, stating that these end up benefiting everyone (Nozick 1974, 177). These consequences are not invoked by Nozick for consequentialist reasons, but to demonstrate that the proviso is met (Wolff 1991, Chapter 4). This tells us that what Nozick wants us to consider is not whether an individual appropriation makes someone worse off, but whether one would have been better off if there had been no appropriation of private property at all.

Since private property has historically been crucial in economic development, Nozick can argue that even people who do not hold large amounts of property have benefited from it due to employment opportunities that result from capitalist development. When resources remain unheld, such development would perhaps not have been possible. Cohen (1986) argues that the problem with the proviso is that Nozick does not justify his baseline of comparison. Why should we consider whether people are worse off compared to a state where everything is unheld and not to a state in which there has been some other appropriation (Cohen 1986, 126-128), or to a state where there has been collective appropriation, leading to a form of socialism (Cohen 1986, 129)?

There is, however, a much more fundamental problem with the proviso as a sufficient (rather than merely a necessary) condition, which has to do with how Nozick has construed the notion of 'right'. The reasoning behind the proviso is that if no one is made worse off, no one can object to me appropriating some piece of land. Working the land, putting a fence around it and telling others to stay away, perhaps even appealing to others that a state be formed that protects my claim to the land may thus be a permissible action, after all no one is harmed by it, assuming that the proviso really is not violated. The permissibility of my action of appropriation does not, however, imply any obligation for others to go along with it. It being morally permissible for me to do A does not logically imply that it is impermissible for others to try to stop me from doing A, and any such inference would thus require further support. Stopping me from doing A is a separate action B, performed by some other individual. So logically, there can be no inference from the permissibility of A to the impermissibility of B. The truth of the former does not by itself necessitate the truth of the latter.

There are examples in both philosophy and everyday life that demonstrate that the permissibility of an action does not imply the impermissibility of any action that might interfere with that action. Hobbes argued that the sovereign is allowed to punish individuals, while those he seeks to punish would continue to have the right to prevent their own punishment

(Hobbes 1970, 259). We can also think of a competitive admissions procedure for a prestigious university. It is permissible for applicants to attempt their best to try to secure one of the limited places for themselves through legitimate means, while others are allowed to attempt to prevent them from succeeding by outperforming them.

The more general point here is that the permissibility of an action alone does not automatically force or forbid certain actions by other people. But it is precisely this that Nozick has set out to establish when he claims that people have rights that obligate others to act in ways that do not violate these rights. The argument Nozick has to make is not one about permissibility of the action of appropriation, but about the impermissibility of actions that interfere with that appropriation or with people's holdings that result from such an appropriation.

Jean-Jacques Rousseau famously commented on the origin of property:

The first man who, having enclosed a piece of ground, bethought himself of saying *This is mine*, and found people simple enough to believe him, was the real founder of civil society. From how many crimes, wars and murders, from how many horrors and misfortunes might not any one have saved mankind [sic], by pulling up the stakes, or filling up the ditch, and crying to his fellows, "Beware of listening to this impostor; you are undone if you once forget that the fruits of the earth belong to us all, and the earth itself to nobody." (Rousseau 1754, Part 2)

Nozick does not just have to argue that Rousseau is wrong in his assessment of the consequences of the introduction of private property, but that the actions of the imaginary hero in Rousseau's story are impermissible (rather than just foolish).

Even then Nozick's work is not done. Let us assume that we accept that any action taken to prevent the permissible appropriation of land is itself impermissible. Perhaps we might say that while there are exceptions to this rule, in general we should not prevent other people from performing permissible actions. Since we assume the appropriation is in accordance with Nozick's proviso, no harm is being done to others and it is thus permissible. Therefore, Rousseau's hero is not allowed to attempt to prevent the fence from being erected. We might add that it is also not permissible for him to tear down the fence as long as no one is being harmed by the private holding of the land.

But Nozick's claim goes even further than this. He claims that Rousseau's hero is not allowed to tear down the fence even if the original assumption that no one is worse off due to the continued private holding of land is no longer true. Even if Rousseau's hero were able to conclusively demonstrate to everyone after a few years have passed that it would now be greatly beneficial for a significant number of people to reverse the introduction of private property, this would still be forbidden according to Nozick as long as everyone has overall

benefited from the original introduction of private property. This does not follow from the assumption that we should not prevent permissible actions but goes far beyond this. It is a significant stretch and Nozick fails to provide conclusive reasoning for why Rousseau's hero would be violating his duty by attempting to dissolve the institution of private property even when its continuation has become harmful.

Even if Nozick is right that the historical introduction of private property has had a net benefit for all affected, this does not imply that it is impermissible for someone to later take action to eliminate the institution of private property. It is perfectly conceivable that the historical introduction of private holdings was legitimate, but that it is now better to redistribute these holdings or to bring them into public ownership. The original appropriation, even when in accordance with Locke's proviso, does not create an eternal obligation to make no changes to these holdings or to continue to maintain the institution of private ownership. So, perhaps it is not too late for Rousseau's hero (or a heroine) to make an appearance.

Others have argued that it is arbitrary for Nozick to assume that acquisition in accordance with the proviso leads to full property rights, rather than limited ones (Wolff 1991, Chapter 4). One might for example be able to gain the right to possess and use, but there is nothing in the proviso that mandates that the right to transfer must also be included. My point goes further than this. Appropriation, even when done in accordance with any form of the proviso, does not lead to rights as understood by Nozick at all (neither full rights nor limited ones), for Nozick has a very strong definition of what it means to have a right. It means that others (including social institutions) are obligated to act in a way that does not interfere with that right. While adherence to the proviso might make the action of appropriation permissible in some cases, no obligations for others follow from this. The proviso does thus not establish a side-constraint that obligates any person or institution to respect and maintain private property relations. Nozick may well be right that the introduction of private property has led to economic development that has improved opportunities for all. And perhaps such development could historically not have been achieved in any other way. It does not follow that we are obligated to maintain the institution of private property beyond its usefulness for economic development. Deliberations about the welfare consequences of economic systems and institutions should thus not be constrained by whether they adhere to historical entitlements.

Nozick fails to provide a solid deontological objection to socialism. We can accept Nozick's notion of rights as strict side-constraints on permissible (state) actions. But we then need to consider what side-constraints there really are. Nozick claims that individuals may have full property rights to their holdings, thus making it impermissible for a state to limit what they can do with those holdings. This would mean that socialism necessarily has to violate rights. But according to the interpretation that is closest to the text, Nozick does not specify how these property rights have come about, even less does he argue for this process actually granting full (or any) property rights. According to an alternative interpretation, Nozick's version of

Locke's proviso is not only a necessary, but also a sufficient condition for acquisition. But here, too, Nozick fails to provide adequate reasoning for why acquisition should yield full property rights, or any lasting rights at all. By the way that Nozick has construed the notion of rights and property rights, he has created an impossibly difficult target for himself to meet. And indeed, he fails to meet this target by providing a convincing justification for such rights and thus the illegitimacy of socialism.

A more Marxist response to Nozick might reference the Marxist concept of primitive accumulation, which describes how ownership of resources came about in a process not as peaceful or harmless as suggested by Nozick (Marx 2008, 741-791). Indeed, primitive accumulation has been discussed in the context of Nozick's theory by Cohen (1995, 167-168), along with several other significant socialist objections to Nozick. My objection goes further in a way, as my rejection of property rights does not depend on the historical circumstances under which private property came to be. There are no imaginable historical circumstances which would lead to property rights as side-constraints, or at the very least Nozick gives us no good reason to think there are. Even where the introduction of property rights was historically justified, there is no strict requirement to maintain it beyond those historical reasons. Instead we are free to consider property relations and the distribution of specific holdings in light of their current and future consequences for welfare.

3.4 Conclusion

In this chapter, I have considered Marx's views on exploitation and justice and provided a welfarist interpretation of Marx. This is not only one of several possible interpretations of Marx, but it also yields a plausible normative basis for our consideration of socialism. The welfarist account of Marx shows significant parallels to classical utilitarianism, the main difference being that Marx rejected the utilitarian concept of cardinal utility. In order for Marx's critique of capitalism to make sense, we must, however, understand him to assume some form of need ordering and the possibility of interpersonal comparison of the importance of those needs, both of which are also assumptions of classical utilitarianism. On this basis, the significantly unequal patterns of distribution under capitalism can be criticised because the wealth of the bourgeoisie can be considered less important than the satisfaction of urgent needs of the working class. Absence of exploitation is, according to this interpretation, not an intrinsic normative basis for a just distribution, but the mechanism by which entire classes of people are systematically deprived of their ability to adequately satisfy their needs. It is this deprivation that motivated Marx and should motivate us to reject capitalism and advocate for the introduction of a socialist order which more adequately provides for the welfare of all.

In the final section I have considered Robert Nozick's deontological objection to socialism, as implied by his entitlement theory of justice (Nozick 1974). Nozick argues that socialism

necessarily and illegitimately violates property rights. Rights, for Nozick, form strict side-constraints on permissible actions of individuals and the state. However, Nozick fails to adequately demonstrate how such property rights come about and why such a process should result in full property rights or any rights at all. According to one interpretation, Nozick fails to adequately specify a theory of acquisition and thus does not provide an account of how property rights come to be. According to an alternative interpretation Nozick considers his version of Locke's proviso to be not just a necessary, but also a sufficient condition for gaining property rights. But the argument for this fails, as adherence to the proviso only implies that appropriation of things previously unheld may be permissible. It does not imply that any 'rights' are granted through such appropriation. Nozick thus fails to provide a deontological reason against the introduction of socialism on consequentialist, welfarist grounds.

Having argued that we should evaluate economic institutions based on their consequences in terms of welfare and having rejected the view that such a consideration must be constrained by property rights, the following chapters will consider the consequences of possible economic mechanisms of a socialist society. The next two chapters will consider socialist distribution in this light. How should a socialist society that is concerned about citizens welfare distribute consumer goods? After that we will consider how productive resources can be deployed in a manner that best accomplishes the goal of welfare by providing as many consumer products of the right kind as possible.

Chapter 4

Distribution of Income and Labour

The following two chapters will consider the mechanisms and patterns of distribution that a socialist society should adopt. In the context of socialism, we are only concerned about the distribution of consumer products: the means of production are not distributed to individuals, but are under social control. The central question is thus how many and what kinds of consumer products each individual should receive.

I am assuming that distribution is organized through a token system, similar to the one discussed by [Marx \(1999a, Part 1\)](#). Individuals are given a certain number of tokens which can be redeemed for consumer products out of social production. This chapter discusses how such tokens should be distributed, while the next chapter discusses the rates at which tokens can be redeemed for consumer goods. I will consider Abba Lerner's argument ([Lerner 1944, 25-30](#)) for equality of income and argue that it should also be applied to leisure time. After allowing substitution between income and leisure time, this will yield a distribution of tokens that is highly dependent on labour time contribution.

In the previous chapter, I proposed a welfarist interpretation of Marx. Such a welfarist approach can be used to evaluate social institutions, including distributional mechanisms. Institutions are to be judged on the basis of their consequences for human welfare. The inequality that arises from the exploitative social relations of capitalism is to be condemned, because the extravagances of bourgeois life lack the moral urgency of the more basic needs of the working class. It is thus unacceptable that resources be dedicated to these bourgeois extravagances and not to the pressing needs of the wider population. Socialist society should thus distribute consumer products more equally to make sure these urgent matters are given priority.

Throughout this chapter, I will be drawing on utilitarian thought to make this case more formally. As I pointed out in the previous chapter, Marx disagreed with the utilitarian claim that there is a single, cardinal scale of utility that ought to be maximized. However, I will

argue that the fundamental utilitarian argument for income equality (Lerner 1944, 25-30; Brandt 1979, 309-315) is also compatible with a more general notion of welfare and does not require us to understand utility to be measurable on a cardinal scale. The arguments in this chapter should thus be accepted by both utilitarians and Marxist critics of utilitarianism. Furthermore, I will introduce leisure as a concern in addition to the consumption of material products. Free time is as important a precondition for the satisfaction of needs and human welfare as material consumption is, and the distribution of free time must thus also be taken into account in any welfarist take on distribution.

There are good reasons for considering distribution in terms of income, rather than a direct distribution of material products. Two main advantages are identified by Brandt (1979, 311-315), who has a monetary income in mind, but the same applies to a token income. First of all, a token income easily allows for a division into equal shares. One might add to this, that it can also be divided into any combination of unequal shares.

Secondly, distribution in terms of income allows individuals to choose what to spend their income on. This will increase overall satisfaction as individuals are able to satisfy their most important needs. This rests on the assumption that individuals which actually spend their income in a way that best satisfies their needs. This may not always be the case as individuals may use their tokens in an irrational manner or simply pursue objectives other than the satisfaction of their needs. But since individuals are generally in a much better position to judge what is good for them, as they have knowledge of their individual circumstances and desires, allowing individuals free consumption choices within reasonable limits seems the best bet when trying to ensure satisfaction of individual needs.

Dworkin (Dworkin 1981; Dworkin 2002, 65-73; Dworkin 2011, 356-358) also suggests that some form of tokens be used in distribution, arguing that an auction based on an equal division of tokens is the only way to satisfy the egalitarian demand that people be treated as equals. I will consider Dworkin's auction further in the next chapter. For now I will simply assume that distribution is facilitated by some kind of income because it makes it possible to divide income as appropriate, while allowing consumers to choose the kinds of products they need the most.

By considering the distribution of token income, I am not claiming that all goods and services should be distributed through a token system. For things like healthcare or education a socialist society is likely to adopt a different approach. A certain share of resources would go towards what Marx refers to as 'common funds', which are not made available to private individuals through the token system. These resources might instead be managed collectively or made available to individuals on some other basis (such as needs).

In the first section of this chapter, I will outline Lerner's argument for income equality (Lerner

1944, 25-30), which can be seen as a first baseline for adequate distribution. The baseline of equal distribution of income is then amended in the second and third sections where I will consider the significance of leisure time, labour and individual differences in needs and abilities for determining an adequate distribution. In the fourth section, I will then consider Marx's distinction between a lower and a higher stage of communism. While the lower stage would be based on the tokens assumed here, the higher stage would distribute consumer goods and labour based on a direct consideration of individual needs and abilities. I will argue that Marx was mistaken in his insistence that the lower stage of communism needs to be superseded by a higher stage, because the lower stage can sufficiently accommodate the needs principle.

Throughout this chapter, I will assume that income is denominated in terms of a certain number of tokens which can be redeemed for a share of the social product, while ignoring the token prices for which individual products can be acquired. However, a complete picture of distribution is not given until these prices are also specified. This will thus be the main focus of the next chapter, in which I will also discuss the differences and similarities between such a socialist token system and a money-based market system.

4.1 Equality of Income

In this section, I will consider Lerner's case for an equal distribution of income (Lerner 1944, 25-30). Lerner starts off his case for equal distribution by saying that no part of social income should go to 'any individual but the one who can obtain the greatest satisfaction from its consumption' (Lerner 1944, 25). This is in line with our broadly welfarist assumption that distributions ought to ensure human welfare. While Lerner has a kind of preference satisfaction approach in mind, satisfaction could also refer to the satisfaction of objective needs. In that case, we would say that any part of income should go where it can satisfy the greatest need. Lerner's assumption so far is thus indifferent to the precise concept of welfare used, as long as there is an interpersonal ordering of welfare states in terms of moral urgency. We must be able to rank needs in the sense that we can meaningfully say that one need is more important than another. But we must not be able to assign the satisfaction of those needs a cardinal number. We can even accept that there are various distinct dimensions to need satisfaction, as long as we agree that in the end needs can be ranked in terms of importance. Lerner's first assumption can thus be accepted even by readers who subscribe to Marx's needs-satisfaction perspective and agree with his rejection of cardinal utility.

Next, Lerner assumes the diminishing marginal utility of income: 'the extra satisfaction [an individual] gets from a given increase in his income (the marginal utility of income) is less if his original income is greater' (Lerner 1944, 26). This assumption is more difficult to express in terms which do not assume a cardinal scale. But that the basic premise can and should be

accepted even by welfarists that are not willing to accept cardinal utility becomes apparent when we consider the justification of the principles of diminishing marginal utility of income. The justification commonly given (Lerner 1944, 25-30; Brandt 1979, 309-315) is that with limited income, individuals will acquire those goods that give them the greatest satisfaction for that income. Any additional income will thus be used to acquire less satisfying goods. This can easily be translated into alternative concepts of welfare. An individual will first use their income to satisfy their most urgent needs and then spend any additional income on less urgent ones. The general principle can thus be applied even outside the narrow preference satisfaction utilitarian approach. I am sure it is also possible to construct a concept of welfare in which the argument cannot be applied, but its applicability is certainly not limited to preference satisfaction utilitarianism. Though I wish to maintain a rather general notion of welfare so that the argument can appeal to a broader audience, it is at this point necessary to assume that our concept of welfare is compatible with some form of decreasing importance of additional income.

In the previous chapter, I indicated that a welfarist critique of the inequality of capitalism requires the assumption of interpersonal comparison of welfare. Lerner makes the same assumption in his argument for an egalitarian distribution. Needs of distinct individuals must be similar in some sense so that they can be compared, enabling one to make statements such as ‘Thy need is greater than mine’ (Lerner 1944, 25). While Lerner admits that one might be wrong about such comparisons – perhaps there even ought to be room for disagreement on matters like this – such a statement is not nonsensical. His assumption only goes so far. He does explicitly not claim that we can have knowledge of which need is greater when making comparisons between distinct individuals. He only has to assume that such claims can be meaningfully understood.

Assuming a strictly decreasing marginal utility of income, the distribution that maximizes welfare is the distribution in which the marginal utility is equal between all individuals. Should an individual have a lower than average marginal utility of income at a given distribution, some other individual could make better use of some of his income. But this does at first not seem to justify an equal distribution of income, since individuals might differ in how much use they get out of income.

A well-known objection to utilitarianism by Nozick (1974) is based on this prospect: ‘Utilitarian theory is embarrassed by the possibility of utility monsters who get enormously greater gains in utility from any sacrifice of others than these others lose’ (Nozick 1974, 41). Such a ‘utility monster’ would be able to make better use of any resources, no matter how many it already has. Utilitarianism, and perhaps other forms of welfarist consequentialism as well, would thus have to allocate all possible resources to the satisfaction of the desires of this utility monster.

The utility monster argument suggests that such a hypothetical scenario would demand a distribution that is counter-intuitive and should be rejected on the basis that it fails to give an adequate account of this special case. While some might, like Nozick, reject welfarism on the basis of its applications in the hypothetical utility monster case, it is not at all clear that this case corresponds to reality. In reality, humans are a lot more similar in their needs than assumed in the utility monster case and the extent to which they do differ is largely an empirical question. There are certainly some cases in which a greater allocation of resources to one person's needs can be justified on welfarist grounds, such as in the case of sickness or injury. This will be discussed further later on in this section, but such cases are not as extreme as the utility monster case.

I believe that part of the appeal of the utility monster thought-experiment is not that its consequences are so counter-intuitive should a utility monster actually exist, but that we have a natural tendency to be sceptical of someone claiming to be able to make better use of resources than others. The wealthy and entitled might use such a claim to justify why they should have more than others: the poor simply do not have such a distinguished taste. But in reality the rich and the poor are not so different. They share the fundamental need to live in comfort and security. The utility monster thought-experiment goes against our intuition because we generally consider humans to be much more alike in terms of their needs and aspirations.

The point of the utility monster case is of course not that such monsters actually exist, but that utilitarianism leads to counter-intuitive consequences in such a hypothetical case. But if we are undeterred by this, it does not follow that we must actually bring around a highly unequal distribution of income. Such cases can be disregarded for practical purposes because they do not correspond to reality.

[Lerner \(1944, 28-29\)](#) raises the point that from the perspective of society or the state it would in most cases be impossible to know who would be able to make greater use of additional resources than others. If someone were to claim to be a utility monster, and that as much income as possible should thus go to themselves, there would be no reason to believe them as they would have every reason to mislead on the matter. There is also the question whether any individual would even be able to tell for themselves whether they are a utility monster, as the notion of a utility monster is based on a relative comparison to others. The utility monster does not just get a lot of pleasure out of the sacrifices of others – this pleasure must be greater than these sacrifices. While we might be able to make certain deductions about other people's experiences we have no direct access to them.

But the more fundamental problem is that it would be impractical for any social institution to gather information on all citizens' needs and ability to gain satisfaction from income or resources. This would require giving significant attention to each individual to study whether

they might be able to make better use of additional income or resources than others. This is likely to be feasible only in limited cases, where such differences are easily recognizable or their recognition is of great importance (cf. Section 4.3).

The point is that any consideration of the distribution of income must necessarily be made under significant uncertainty about who might be able to make better use of income. Lerner thus argues that we can only maximize the ‘probable total satisfaction’ (Lerner 1944, 29). The argument for equality of income given by Lerner (1944, 29-30) states that without knowledge of individual differences in the capacity to gain satisfaction from income, a transfer of money (or tokens) from a richer individual to a poorer one is always more likely to increase satisfaction than to decrease it.

Should the rich person be dispositioned to gain more satisfaction out of income, they might benefit more from the additional income. But this is cancelled out by the opposite possibility: in light of our ignorance it is just as likely that the poorer person has a fundamental disposition to gain more satisfaction out of income. Distributing income from the richer to the poorer is thus at least as likely to increase satisfaction as it is to decrease it.

But there is a third case we must consider which thus becomes decisive. It is also possible that both have an equal capacity for satisfaction. In this case, due to the principle of decreasing marginal utility, satisfaction will always be increased when redistributing from a richer to a poorer individual. Since all three cases are possible, redistribution from a richer individual to a poorer one is thus more likely to increase satisfaction than to decrease it. We must thus always redistribute income until we reach a state of equality. The situation of the utility monster is irrelevant, unless we have good reason to believe someone actually is a utility monster. In the more likely case of ignorance, we ought to distribute income equally.

Lerner’s assumption of ignorance has been criticized as too strict (Friedman 1947, Samuelson 1964), though Sen (1970, 196) contests that Lerner’s argument is also valid under more generalized assumptions. But Lerner does not have to maintain that the ignorance assumption necessarily holds true under all circumstances for a weaker version of his probabilistic egalitarianism to be sensible. There may well be circumstances under which knowledge about individual differences in capability for satisfaction is available and should thus be taken into account in distribution. But even under these circumstances there is probably more that we do not know about such capabilities than we do know. I thus suggest that equality serve as a baseline of distribution, to be amended in cases where there is a deviation from complete ignorance. I will discuss cases where I think such amendments make sense in Section 4.3.

Given the lack of available information on individuals’ preference structures this is a sensible approach. Rather than attempting to individually identify how much income or resources a person should have based on their presumed preference structure, an endeavour that will

prove futile in most if not all cases, we instead distribute income equally and see in which cases an adjustment might make sense based on available information. This process appropriately recognizes unavoidable ignorance, while also taking into account any knowledge that does happen to be available.

Once again, we can ask whether Lerner's argument is also acceptable without the assumption of cardinal utility. The fundamental issue of uncertainty surely seems to be unrelated to cardinal utility. Assuming we believe there to be some interpersonal ordinal ranking of needs, we will not necessarily know where to put individual needs on that scale. Without having detailed knowledge of people's individual situations and states of mind we will not be able to judge whose need for additional income or resources is of the highest moral urgency. No reference to cardinal utility is necessary here.

We can also accept a non-cardinal formulation of the principle of decreasing marginal utility: individuals tend to satisfy less and less important needs with any additional income. We do not need to claim that needs satisfied with additional income have a lower number on some cardinal scale, only that they are in some sense less morally urgent. However, by accepting that such a ranking of needs is in principle possible, we do not automatically know how to order needs of distinct individuals. But, as argued by Lerner, it is more likely that transfer of income from a richer individual to a poorer individual would lead to the satisfaction of a more urgent need. We should thus only stop transferring money or tokens from the richer to the poorer individual once we have reached an equal distribution of income. For this general argument to work, we do not need to assume that the presumed importance of needs can be mapped unto a cardinal utility scale.

Lerner's argument for equality of income can thus be accepted even by those who reject the cardinal view of welfare. However, as we shall see, further considerations about distribution must be made and equality of income only serves as a starting point for the argument presented throughout this chapter. We still must consider the role of leisure, labour and knowable individual need differences in determining distribution, which is what we will look at in the following sections.

4.2 Leisure and Labour

In the previous section, we have assumed that the distribution of income is the sole decisive factor for the satisfaction of needs. Arguably, free time that can be dedicated to recreational activities is a much more important, or at least as important precondition to need satisfaction as income is. Leisure time is mainly constrained by the requirement to perform labour. How labour time is distributed among the population thus becomes another important distributional question that we must address. The socialist labour movement has long recognised

the importance of free time and has struggled for reduction of the working day. This struggle over the work day and the general importance of time was also recognised by Marx (2008, Chapter 8). When workers are exploited it is ultimately their time that they are deprived of. The importance of leisure time has also received some recognition in liberal political philosophy, most notably from Rawls (Neufeld 2018, Rawls 2001, 179). Here I will treat the issue from the welfarist perspective that I have adopted so far. I will begin by treating the question of the distribution of leisure as completely separate from income before intertwining them later in this section by allowing for substitution between the two spheres.

When treating the distribution of leisure as independent from income, we can make an analogous argument to Lerner's argument for equality of income. We can expect there to be a decreasing marginal utility of leisure time. An individual will spend the first hours of leisure time on the activities most enjoyable to her. Any additionally gained leisure time achieved by a reduction in working hours will thus be spent on less and less enjoyable activities. A possible objection to this is that individuals could simply use the additional free time on the same recreational activities and would thus not experience a reduced utility of leisure time. I think that this is implausible, as there is only so much time one can spend doing the same sort of thing before it becomes repetitive and boring and one loses interest. One will thus experience a reduced benefit from the same activity or move on to other things. These activities can be expected to be less pleasurable, since the original leisure activity was given preference over them, given more limited time. It is also plausible that there are some needs which can be fully satisfied in a certain time period and additional time spent on that need will not yield additional satisfaction. For example, some people might desire to practice sport once or twice a week to remain fit, but once they have fully satisfied their need for physical exercise, they will have no desire to spend more time on it.

When deciding on how to distribute labour time between individuals, we might also want to take into account individual differences in the level of enjoyment gained through leisure time. But since social institutions are likely to be ignorant of such differences for the same reasons they are largely ignorant about individual differences in satisfaction gained from income, we can only consider the probable enjoyment achieved through leisure. As Lerner argued regarding income, under ignorance about individual difference and decreasing marginal utility, equal distribution is optimal. That is because redistribution of leisure time from someone with more free time to someone with less is more likely to increase enjoyment than to reduce it. Equality should thus serve as a baseline for distribution of leisure time, as it does for income. Assuming leisure time is restricted only by labour time, this means in turn that labour time ought to be distributed equally. Our new baseline is thus an equal distribution of both labour time and income. The labour time that is required for social production and administration is to be shared equally among all, as are consumer goods and services provided through that labour.

Lerner (1944, 36) argues that the baseline of equal distribution of income may be altered if an individual is willing to work additional hours to gain extra income. Let us assume that a completely equal division of labour and income would lead to everyone working 8 hours a day and receiving 800 tokens. Let us for now also assume that the social product is directly proportional to the number of hours worked. There is then no principle reason to object to someone working an extra hour, producing extra consumer goods, in return for an extra income of 100 tokens which can be redeemed for a share of the social product equivalent to the additional goods thus produced. If someone thinks such an arrangement would better serve the satisfaction of their needs, there seems to be no reason to stop them. It would increase their satisfaction without negatively impacting the satisfaction of others.

We can take this argument even further than Lerner did. Lerner did not consider the case that someone might wish to work less and be willing to accept a corresponding reduction in income. Perhaps this person does not gain much satisfaction out of material goods but is happier when having more time for hill-walking or some other recreational activity. Allowing for such a modest lifestyle would similarly not inflict harm upon others and could increase overall satisfaction for some.

We thereby arrive at the following rule:

Under ignorance about individual preference structures, the distribution of income and leisure that can be expected to best satisfy needs is a distribution that has come about from an equal division of income and leisure after allowing individuals to substitute between the two.

Once we allow individuals to substitute leisure time and additional income, we divert significantly from the original assumption of an equal distribution of leisure and income. Instead we arrive at a scenario where individual income is proportional to the number of hours worked, as in the labour token system discussed by Marx (1999a, Part 1). The original assumption of equality now simply mandates that labour be matched by income at an equal rate for all workers and that labour is the only source of income (we will introduce exceptions to this in the next section). We have thus arrived back at a version of the ‘workmanship ideal’ (Shapiro 1991) that was discussed in the previous chapter. But the reasoning for this is no longer that labour leads to some form of property right or entitlement, but that a distribution based on the workmanship ideal best ensures the general satisfaction of needs.

So far, we assumed that the social product is proportionally increased with labour time. This would imply that working extra hours in exchange for a proportionate increase in income would have no negative effect on the consumption opportunities of others and should thus be allowed. In reality, there are certain resource constraints which might reduce the amount of consumer products yielded through putting in additional hours. A classic example of this

is the decreasing marginal yield of agriculture as less fertile land has to be cultivated. An increasingly worrying concern is also the amount of greenhouse gases emitted as part of human economic activity and the effect that this will have on the planet's climate system (IPCC 2014). To reduce undesirable changes in the climate, the amount of greenhouse gases emitted into the atmosphere must be limited to an increasingly smaller amount. Adherence to such a constraint on emissions means that the performance of additional labour will not necessarily lead to a proportionate increase in the supply of certain goods. Their production would require additional emissions, which is prohibited by any constraint on emissions that might be put in place, or more environmentally friendly (but less effective) production methods might have to be employed.

When we assume a decreasing marginal product of labour, substitution of leisure for additional income might end up reducing the standard of living of others. The premise that substitution does no harm to others thus no longer holds true and allowing for substitution thus does not necessarily lead to a better satisfaction of needs. There are, however, two possible ways of dealing with this matter which would still allow some substitution to take place. We thus do not have to resort back to a distribution where both income and leisure are distributed strictly equally, disregarding differences in expressed preferences for levels of income and leisure. The first way would be to reduce the income gained with each additional hour worked, such that the decreasing income corresponds to the decreasing marginal product of labour. This way the additional income would be exactly matched by additional product, and those who choose not to put in additional hours would not have their level of consumption reduced. Estimating the marginal product of additional hours worked might, however, be difficult or even impossible. In such a case it might be best to disallow substitution for additional income completely. But even then, people would still be able to substitute part of their income for additional leisure. This does not put additional strain on scarce resources or the environment, in fact it reduces the strain and thus has a net positive effect. In this scenario there would thus be a maximum income that can be earned, while allowing individuals to earn less if they prefer to have more free time instead. The maximum income would be the base income, part of which can be substituted for additional leisure time.

A separate reason commonly given for linking income to labour is that this serves as an incentive to work. Brandt (1979, 309-311) thus argues that the equal distribution of income mandated by Lerner's argument must be amended to create an incentive. He suggests that an equal basic income be paid to all, which can be supplemented by income earned through labour. This income ought to be no larger than is necessary for it to function as an incentive (Brandt 1979, 309-311). In Brandt's view an income incentive to work is a fundamentally undesirable, but necessary, deviation from the principle of equality. But since, as I have argued, both leisure and income ought to be distributed equally (while allowing for substitution between the two), there is no such conflict between equality and incentive to work and no need to create an incentive that somehow violates the principle of equality. This state of

equality already links income to labour time. Moreover, Brandt's system fundamentally violates the principle of equality of leisure, since neither he nor Lerner seem to have realised that Lerner's argument for income equality similarly applies to leisure time. Brandt's system allows some potential workers not to contribute an appropriate share of their time towards social production. While they will have somewhat less income than those who work, this does not completely balance out their lack of labour contribution, as it would when income is directly proportional to labour time.

A remaining question is whether the level of income ought to differ depending on the kind of labour performed, rather than just the duration. Based on the argument so far, time should be the only factor in determining income. There is some room for extending the argument in a way that demands for differential pay. For example, one might argue that a particularly demanding job drains one's "energy" much faster, leaving workers with less energy for recreational activities. The argument for income and leisure time equality would then also be applicable to the "energy" people are able to use for recreational activities. Some professions might simply leave workers too tired to satisfy any of their recreational needs after a full day of labour. In practice, I think such a consideration would ultimately be very difficult to take into account, as it is not at all clear how one might measure the extent to which various kinds of labour drain people's "energy".

Independently of how labour effects our ability to enjoy our leisure time, we might find various kinds of labour more or less enjoyable or unpleasant in themselves. Some might feel that this should be taken into account as a matter of fairness, independently of any consideration of social welfare maximisation. Within the welfarist framework, it can be argued that some particularly pleasant jobs should already count towards people's leisure time, as the labour activity might be one that people would also do in their free time for recreation or personal fulfilment. In such cases the assumption that labour time restricts leisure time does not necessarily hold true and the distribution would have to be adjusted accordingly.

Furthermore, allocation of jobs should consider differences in individual preferences. This is relatively simple in the case where enough volunteers can be found for a job that most people do not want to do. But even if no volunteers can be found for a particular task, there might still be people who would mind doing it less than others. A differential pay incentive could function to identify these workers. They would be likely to accept the undesirable job at a somewhat higher pay rate, when others would reject it even at that higher rate. While Brandt's payment of incentive was meant to motivate people to work at all (rather than simply live off their basic income) this incentive would be meant to get people to voluntarily accept particularly unpopular positions. An alternative might be the use of algorithms for matching under preferences ([Manlove 2013](#)), which can take into account individual preferences in job allocation without the need for differential payment.

I will not provide a more detailed investigation of whether some level of differential pay is appropriate and will not reach a conclusion on the matter. What this section has shown is simply that there are good welfarist reasons for income to be dependent on labour contribution. This means that socialist labour token proposals are in principle consistent with a welfarist position. Furthermore, demands for some form of equality can be directly deduced from a welfarist position. In liberal political philosophy such egalitarian demands are often seen as a question of ‘fairness’ (Rawls 2001). What Lerner’s argument and my extension of it show is that even without an assumption of fairness, significant demands for equality can be derived from a purely welfarist perspective. The distribution of tokens under socialism should thus reflect these egalitarian demands, even without any demand for ‘fairness’.

4.3 Common Funds

Marx (1999a, Part 1) argues that workers cannot be paid the full value of their labour in tokens, as considerable deductions have to be made for what he calls ‘common funds’ (Marx 1999a, Part 1). As I have stated at the beginning of this chapter, we do not have to assume that all products or services will be distributed through the token system. Under these common funds, Marx subsumes things like healthcare and provision for those unable to work. In this section I will show that free (at the point of use) provision of healthcare and provision for those unable to work is consistent with my adoption of Lerner’s argument once the assumption of ignorance is relaxed. I will also consider how the additional labour necessary to sustain such common funds should be distributed. This can be seen as a kind of tax, though I will offer an alternative to the tax interpretation in Section 5.3.

The idea that some kind of baseline of equality should be complemented by a consideration of individual circumstances has been proposed from a variety of philosophical backgrounds. Both Ronald Dworkin (1981, 2002, 2011) and Marx (1999a, Part 1) complement their respective token-based systems of distribution in this way. For Dworkin, the outcome of an auction which uses tokens equally distributed among all constitutes a baseline for a just and equal distribution (more on this in the next chapter). It needs to be complemented by a hypothetical insurance scheme to prevent inequalities arising from an initially equal distribution, for example, due to bad fortune. Marx, too, considers a (labour-)token system to be insufficient on its own. In fact, one of his main points of criticism of the programme of a socialist party at his time was that their token-based system did not take into account the need for public expenditure and insurance, which he argued had to be paid for by a tax-like mechanism (Marx 1999a, Part 1).

Rather than the full proceeds of labour being paid out to workers, significant amounts would have to be deducted: ‘First, cover for replacement of the means of production used up. Second, additional portion for expansion of production. Third, reserve or insurance funds to provide

against accidents, dislocations caused by natural calamities, etc.’ (Marx 1999a, Part 1). These three deductions Marx considers to be economic necessities. The first two points relate to the fact that under socialism the means of production are publicly owned. It follows that their replacement and expansion have to be publicly funded. The third point comes very close to the kind of considerations Dworkin (2002, 2011) would later make, namely the need for insurance against accident, natural disaster or other kinds of misfortune.

However, Marx is not done with deducing from the share of the social product given out to workers through the token system. Additional deductions have to be made for public administration, public services and social security:

First, the general costs of administration not belonging to production. [...] Second, that which is intended for the common satisfaction of needs, such as schools, health services, etc. [...] Third, funds for those unable to work, etc., in short, for what is included under so-called official poor relief today. (Marx 1999a, Part 1)

Marx in the same piece famously established ‘From each according to his ability, to each according to his needs!’ (Marx 1999a, Part 1) as the fundamental distributional principle in the higher stage of communism. But even in the lower stage, aspects of this principle can be found. Education and healthcare are not resourced through the token system but through public funds. They are thus distributed in accordance to need and not ability or willingness to pay. People unable to work, because they are too sick or too old, are provided for without having to work. This, too, is an exemplification of the needs principle.

Dworkin also believed taxes should be levied to pay for some of these measures, though not all of them. He specifically mentions ‘unemployment and low wage insurance, medical care insurance, and social security for people in retirement’ (Dworkin 2011, 361) as types of insurance that ought to be provided through taxation. The level of this tax-funded insurance ought to be determined through a hypothetical insurance scheme which is imagined as part of his auction. By doing so, Dworkin hopes to establish what level of insurance most people would be willing to pay for:

What level of insurance against low income and bad luck would people in our own actual community buy if the community’s actual wealth was equally divided among them, if no information was available that would lead anyone or any insurer to judge that he was more or less at risk than others, and if everyone otherwise had state-of-the-art information about the incidence of different kinds of bad luck and the availability, cost, and value of medical or other remedies for the consequences of that bad luck? (Dworkin 2011, 360)

Any level of insurance that people would choose under those circumstances is the minimum level of insurance that ought to be provided, ‘because the programs the scheme identifies

reflect reasonable assumptions about the overall preferences of the community over risk and insurance, a government that did not provide them would fail in its economic responsibilities' (Dworkin 2011, 361). By tying the level of coverage to a hypothetical insurance auction, Dworkin intends to make the number of resources spent on insurance sensitive to people's actual preferences.

There are clear differences in Dworkin's and Marx's approaches to public expenditure and insurance. They differ in the sort of things they argue should be publicly resourced, and on how the level of expenditure ought to be determined. While Dworkin makes a specific suggestion on how the level ought to be determined, Marx remains vague on the issue. He merely states that 'their magnitude is to be determined according to available means and forces, and partly by computation of probabilities' (Marx 1999a, Part 1). In clear conflict to Dworkin, Marx goes on to say that 'they are in no way calculable by equity' (Marx 1999a, Part 1). While these are clear differences, both thinkers emphasised the need for their respective token-based system to be complemented by public expenditure.

Lerner's argument for income equality, which I have adopted in an extended form here, relies on the assumption that we know nothing about the individual need structures or utility functions of individuals. In some cases, we do have knowledge about individual needs and this can and should be considered when allocating resources or income. The best example for this is illness requiring medical treatment. It is generally objectively testable through medical diagnosis whether an individual requires medical attention. When such a determination has been made, we have information about individual circumstances which might suggest that the individual would benefit from additional resources (in the form of medical treatment) greater than others would. We should thus adapt the distribution suggested by the principles outlined in the previous section to take into account this knowledge. Equality of income and leisure (with substitution) thus becomes the standard distribution, which is to be appropriately amended in cases where the assumption of complete ignorance does not hold true.

Let us make the reasonable assumption that spending a significant amount of resources on medical treatment is a good way of increasing the welfare of the population, better than spending these resources in some other way. This might exclude certain treatments that have little benefit or are unreasonably resource or labour intensive. Assuming that treatment is the better option than using resources in some other way, this begs the question of who is going to bear the cost of treatment, i.e. who is going to have their individual consumption of non-medical goods reduced so that resources can be dedicated to treating the sick. If we were to go with a strictly equal distribution of goods or resources, then treatment must be deducted from the income of the person receiving treatment.

Consider the case of Sally who needs to have her cecum removed because it has become infected. This is a standard medical procedure and it can be expected that Sally will fully

recover with treatment and will not have anymore issues or require further treatment after a short stay in the hospital. Let us further assume that Sally has an annual income of 10 000 tokens, same as everyone else. Should she have to pay for her operation and hospital stay from this income, her spare income for the year might be significantly reduced, let us say to 5 000 tokens. She is now a healthy individual, thanks to treatment, but only has 5 000 tokens available to spend on satisfying her other needs for food, entertainment and so on. Those who did not become sick and thus did not require medical attention still have 10 000 tokens available for those things.

According to Lerner's reasoning for income equality, it is likely that Sally would gain more from additional income than those with 10 000 tokens would lose if some of their income was given to Sally. This follows from the principle of decreasing marginal utility of income (as discussed earlier in the chapter). Sally will only be able to satisfy the most urgent needs with her 5 000 spare tokens, while only slightly less urgent ones will remain unsatisfied. Given our knowledge of Sally's situation – that she requires medical treatment for her infected cecum – the ideal distribution of income would be such that Sally has the same as everyone else once she has paid for her treatment.

The reason Sally should not simply be given the same amount of income (including income to be paid for medical expenses) as everyone else, even following Lerner's reasoning, is that the assumption of ignorance does not hold true. We can and do know that Sally needs treatment and we do not need to take her word for it that she will benefit greatly from this. Her condition can be diagnosed by a medical professional using objectively verifiable criteria. Treatment lifts Sally up to the same level as someone who did not become sick in the first place. Her other needs are thus not affected by this, and she can be expected to benefit just as much from additional income as anyone else. In utilitarian language, her expected marginal utility is the same AFTER having paid for medical expenses. We thus need to equalise her post-medical bill income. The same reasoning can also be extended to other needs for which the same conditions hold true, such as assistance for the elderly or disabled.

A simpler way of making sure Sally has the same income as everyone else after paying all medical bills is if the treatment is provided to her for free in the first place, i.e. as part of what Marx calls common funds. In a socialist society this would simply be done by dedicating sufficient labour and resources to the medical sector and treating anyone in need. There would be no need for token pricing of medical services at all, as these would not be paid for with the tokens given out to consumers. That does not mean there would not be a consideration of economic cost of medical services, but this cost would be measured in terms of the resources and labour needed for treatment and how these might otherwise be deployed (see Chapter 6 for a more general discussion of how resources should be allocated in a socialist society).

Marx also mentions funds for 'those unable to work' ([Marx 1999a](#), Part 1) as being provided

by the public. When we argued that leisure and labour time ought to be divided equally among all, we assumed that everyone is equally capable of performing labour. This is not the case, as some people are incapable of working for medical reasons or it would be unreasonable and not in the interest of overall welfare to require some people to work based on their physical or mental condition. As long as such a condition can be objectively diagnosed, it should be taken into account in the distribution of labour burden. This means that when we disregard any substitution that might be made, some people cannot be expected to perform an equal portion of labour. Necessary labour will have to be performed by other members of society.

It might at first seem to follow that people incapable of working thus have to forgo any income, since I have established that income should be linked to labour contribution. But this was the result of allowing for voluntary substitution which individuals thought would benefit them. Clearly people who are unable to work for clinical reasons do not have a choice in the matter, and this does thus not apply to them. In fact, a substitution of their entire income might put them at existential risk. Instead, we have to consider in isolation whether income would benefit them more than other people. Lacking any further knowledge about their circumstances and need structure, Lerner's original argument applies and the best expected outcome is given when they receive an equal share. This is because, unless we have such additional information, we must expect people who cannot work to be just as capable of gaining satisfaction out of income.

There is some ambiguity in what the level of income of those who cannot work should be in the end. Certainly, it should not exceed any maximum income for those who work. But many workers might have lower income due to choosing to work less. This will differ between workers, so there is no obvious income level that those unable to work should have. Perhaps it should be at or near the average income of the working population. But since the consumption needs of those unable to work matter just as much as those of the working population, they should certainly not be condemned to poverty.

Goods and services provided freely, and anything acquired by those who are not working must be provided through the labour of the working population. The working population will thus have to be expected to work beyond what is necessary to provide for their own token-based consumption. They will also have to work towards any planned expansion of production (investment) or other public expenditures (such as for defense purposes). In capitalist economies, as well as historical socialist economies, this is generally thought to be done through taxation (an alternative view will be discussed in Section 5.4).

[Cockshott & Cottrell \(1993, 113-117\)](#) also envisage some sort of tax. Since in a socialist society all personal income is gained from the state, taxing income would be somewhat simpler. Rather than citizens having to pay a certain amount, that amount might simply be deducted from income and not paid to citizens in the first place. But for now, let us look at it in terms

of a tax. How much tax should be paid and by whom? [Cockshott & Cottrell \(1993, 114\)](#) point out that the redistributive purpose of progressive income taxation is lost when the distribution is considered fair to begin with. There is no reason that higher earners should bear a higher share of the collective burden as long as their higher earnings are simply the result of their choice not to substitute income for more leisure. This is generally not the case in capitalist economies but will be so in a society organized according to the distributive principles outlined here. If all those able to work are expected to bear an equal share of the collective burden, as Cockshott and Cottrell advocate, this does not simply imply a fixed tax rate (e.g. 20% of income), but a fixed amount of tax to be paid by all (e.g. 1000 tokens) ([Cockshott & Cottrell 1993, 115-116](#)).

Such a per capita tax also follows from my adaptation of Lerner's argument. Prior to substitution income and labour is divided such that an individual worker has the following income and labour obligations:

- (1) Equal share of tokens
- (2) Equal share of the labour necessary to produce consumer goods for token purchases by workers
- (3) Equal share of the labour necessary for sustaining communal funds

The differentiation between (2) and (3) is not meant to suggest that any individual will actually spend part of their day producing consumption goods and part of their day working in the health sector. You could still have doctors that work full time in the health sector and factory workers that only produce consumer goods. The distinction is merely meant to represent the total social labour that has to go towards these sectors and each persons obligation to contribute a respective amount of their own time.

Substitution is allowed on the grounds that it might benefit individuals without doing harm to others. But this only holds true between (1) and (2). An individual might decide to forgo part of their income (1) so that they can work less (2). This substitution is legitimate as long as the reduction in production that results from the shorter labour time corresponds to the reduction in consumption by the worker. But an individual does not have to be allowed to reduce their labour share for communal funds (3), as this would either mean other people have to work more to sustain the communal funds or the communal funds would have to be reduced. Either way this decision would negatively impact other people and the assumption that it only improves need satisfaction thus does not hold true.

[Cockshott & Cottrell \(1993, 114-115\)](#) note that a per capita tax is a 'mirror' of basic income proposals such as the one by [Brandt \(1979, 309-311\)](#) mentioned earlier. Rather than everyone receiving free income, everyone able to work would owe a certain amount of income

(in the form of labour). This is necessary in order to resource public provisions and the consumption of the young, the elderly, the sick and the disabled. Any time worked beyond that would go towards personal consumption and individuals would be free to choose the level of work/consumption that best suits their needs.

4.4 Higher Stage of Communism

One challenge faced by a token-based proposal for distribution comes from Marx himself. Marx argued that an initial stage of communism based on labour tokens should eventually be abolished in favour of a higher stage of communism based on the needs principle ‘From each according to his ability, to each according to his needs!’ (Marx 1999a, Part 1). The reasoning Marx gives for this is that the labour token system applies an equal standard to unequal people, thus perpetuating inequality. Workers differ, Marx observes, in their ability to perform labour: ‘one man is superior to another physically, or mentally’ (Marx 1999a, Part 1). Having a physical or mental advantage, these workers would be able to earn more tokens, either through a higher work intensity or by working longer. Similarly, workers also differ in terms of their needs: ‘one has more children than another, and so on and so forth’ (Marx 1999a, Part 1). With an equal labour contributions, workers with more children would nonetheless end up being poorer. Marx considers these problems to be so grave that he argues the lower stage of communism and its token system eventually have to be abolished altogether and replaced with a higher stage of communism in which distribution of labour burden and consumption is based solely on the needs principle.

Lenin understood the needs principle to imply that ‘each will take freely ”according to his needs”’ (Lenin 1999, Chapter 5, Section 4). By freely, he really does seem to imply that there would be no limits on how many consumption goods an individual might claim for herself and even suggests that each could receive, ‘without any control over the labor of the individual citizen, any quantity of truffles, cars, pianos, etc’ (Lenin 1999, Chapter 5, Section 4). The claim that this is possible seems far-fetched and Lenin does not do enough to address this. He implies that significant development would have to precede any phase of communism that realises this and even recognises that it would require a certain degree of voluntary restraint on the part of consumers (Lenin 1999, Chapter 5, Section 4).

However, my main concern with Lenin’s interpretation of the needs principle is not that it seems pie in the sky — which it does — but that it implies that distribution in accordance with needs cannot be taken into account prior to the significant economic development and changes in individual attitudes which Lenin has to assume. How long should sick people have to wait before their need for medical treatment is recognised? Even if we can expect socialism to lead to the changes promised by Lenin, it seems prudent to realise a version of the needs principle even before this.

The problem with Lenin's interpretation is that he understands distribution according to needs to mean that anyone can take what they want and as much of it as they like. That is not what distribution according to needs implies at all. In fact, each receiving goods appropriate to their individual needs implies a significant degree of control over who gets which goods to ensure this outcome. A limit that ensures one does not take more than one needs or that one does not take what is more urgently needed by someone else is not a violation of the needs principle but its realisation.

While Marx's concern about unequal abilities and needs is justified, he is mistaken in assuming that these issues cannot be dealt with within what he calls the lower stage of communism. In fact, in Section 4.1, I have already outlined how Marx himself intended to address these issues within the lower stage. Workers would not receive the full proceeds of their labour, instead parts have to be deducted for both provisions for those unable to work and what Marx calls the 'common satisfaction of needs', under which he explicitly includes health services and schools. This demonstrates that the lower stage already takes into account differential ability and needs. Those unable to work are provided for without having to work, and those with special health needs will get treatment without having to use their tokens for this. Clearly the lower stage as outlined by Marx is not blind to differences in ability and needs. A similar point is made by [Carens \(2003\)](#), who notes:

[T]he principle of distribution according to needs could most closely be approximated in practice by combining an egalitarian distribution of income with societal provision for differentially incurred basic needs. ([Carens 2003](#), 148)

An egalitarian distribution of (token) income with significant common funds to provide for differential needs may be the best way to realise the needs principle.

Can the specific issues that Marx raises in his case for the higher stage of communism be taken into account in a similar way? In terms of ability, Marx argues that some workers might not be as productive as others. People with a disability, for example, might be able to participate in the workforce, but be unable to fulfil the same quotas that other workers can. Should this inability be apparent, it would be quite straightforward to reduce quotas for these workers or reduce the number of hours they are expected to work (while not reducing the tokens issued to them). If this differential ability is not apparent, perhaps because lower ability cannot be distinguished from laziness, then the higher stage of communism would be just as unable to take this difference in ability into account. There is thus no case for the overcoming of the 'lower stage' based on such differences in ability.

In terms of differences in needs, Marx argues that some workers have more children than others and would thus be poorer if given the same number of tokens. The assumption here is that parents would have to use their own tokens to provide for their children. This does not

have to be the case, as provision for children could either be encompassed by the ‘common satisfaction of needs’ (Marx 1999a, Part 1) or by the funds for those unable to work. Schools for children certainly fall under education, which Marx considers to be part of the common satisfaction of needs. Very young children are clearly unable to work, and their subsistence should thus be taken care of through communal funds as well. Older children might technically be able to work – during Marx’s time child labour was quite normal – but the idea that they should not be expected to work and instead have access to education, should not be controversial. They should thus also be provided for through communal funds. One way to do this that is perfectly consistent with the token system and Marx’s lower stage of communism, is to provide tokens to children or their carers, similar to the child benefits paid in many modern welfare capitalist states. As long as these child benefits and common provisions for children are sufficient for the upbringing of new generations, children would not be a source of inequality.

The justification for replacing the lower stage of communism loses its force once we have seen that inequalities in ability and needs can very well be taken into account within the framework of the lower stage. But what about the social and economic changes that Marx thought would precede the transition to the higher stage? According to Marx,

[i]n a higher phase of communist society, after the enslaving subordination of the individual to the division of labor, and therewith also the antithesis between mental and physical labor, has vanished; after labor has become not only a means of life but life’s prime want; after the productive forces have also increased with the all-around development of the individual, and all the springs of co-operative wealth flow more abundantly – only then can the narrow horizon of bourgeois right be crossed in its entirety and society inscribe on its banners: From each according to his ability, to each according to his needs! (Marx 1999a, Part 1)

Marx does not seem to suggest that these changes necessitate a transition to the higher stage, instead these changes are described as a precondition to it. Without sufficiently developed productive forces and wealth, socialist society simply has no choice than to accept the inequality Marx falsely associates with the lower stage. But while this is clearly not Marx’s argument, one might also suggest that significant increases in productive capacities somehow invalidate the token system of the lower stage. And since we have seen significant increases in productive capacities since the 19th century, during which Marx was writing, perhaps the token system is already outdated. I am not convinced by this line of thought though, since the token system is perfectly capable of adapting to increases in productivity.

As productivity increases one of three things (or any combination of these) can be done. First of all, the increased productivity can be used to produce more goods using the same labour. This means more consumer products could be offered to consumers using the available tokens. Assuming the number of tokens issued remains the same, this would decrease token

prices and consumers would be able to afford more products (see Chapter 5 for a discussion of token prices). Secondly, the same amount of consumer products could be produced while lowering labour time, meaning that workers would have more free time while being able to enjoy the same material standard of living. Thirdly, the amount of resources dedicated to public expenditure could be increased to improve sectors like healthcare, education or provisioning for those unable to work. It should be clear from this that increases in productivity are no problem in the lower stage, in fact they would improve people's living conditions without any need to overhaul the system of the lower stage.

Finally, it should be said that the reasoning I have provided throughout the chapter for using a kind of token system continues to apply, even as productive forces are developed. The use of tokens allows the social product to be divided into appropriate shares, while allowing consumers to acquire the products that they deem most appropriate. So not only is there no good reason to eventually abolish the token system, there are in fact very good reasons for keeping it. These are the same reasons we have for introducing it in the first place.

4.5 Conclusion

This chapter has considered the distribution of token income, as well as leisure- and labour time. I have argued that in a hypothetical default state both income and leisure time would be distributed equally. Such a distribution can be expected to lead to the best overall satisfaction of needs through both income and leisure. Individuals would then be allowed to substitute between the two, based on what they think would be beneficial to them. In the end this leads to a distribution which more closely resembles the workmanship ideal, according to which resources should be distributed in accordance with labour contribution. But such a principle is not justified through rights or entitlements supposedly gained by labour, but by the welfare that the implementation of such a principle would lead to.

The argument for equal distribution of income and leisure depends on the assumption of ignorance about differences in individuals' abilities to satisfy their needs using income or leisure. A strict assumption of ignorance does not always hold true, and in some cases we might reasonably expect some people to make better use of additional resources than others. Equal distribution is nonetheless a reasonable default rule, which can be amended by both substitution and a consideration of known circumstances, such as in the case of diagnosed sickness or disability. In the case of sickness, treatment should not lead to a reduction in token spending power for other needs. One way to achieve this would be to provide healthcare for free.

Labour needed for what Marx calls 'common funds' (Marx 1999a, Part 1), which include healthcare, has to be provided by the working population. Since a reduction in the labour an

individual provides might make others worse off (either because they have to work more to make up for it, or because of a reduction in public services), income cannot be substituted for a reduction in the labour time that has to be provided for the upholding of the common funds. This labour represents a kind of tax or community service that all capable of work are expected to provide. Marx's argument for eventually replacing a token-based lower stage of communism with a higher stage of communism was rejected, because the needs principle can be sufficiently realised through such common funds.

Throughout the chapter, I have assumed that tokens can be used to satisfy needs by purchasing consumer goods or services. But we have not yet considered what the token prices of various goods or services ought to be. Without the discussion of how and at what rates tokens can actually be transformed into things which can directly satisfy needs, we do not yet know what kind of distribution of actual stuff a certain distribution of tokens will result in. This is a serious gap, since our starting point was the satisfaction of concrete needs, and not the distribution of some hypothetical unit of account. We will fill this gap in the next chapter, where I will consider in detail how token prices ought to be determined.

Chapter 5

Converting Tokens into Goods

In the previous chapter, I discussed how token income ought to be distributed. But this alone does not give us a complete picture of who will end up with which consumer goods. We must also specify how tokens can be redeemed for consumer products and at what token prices. How many tokens must be redeemed for a personal computer, compared to an apple? This is an important question, because what we should be concerned about is not the distribution of some abstract token unit, but the material consumption goods that people require to satisfy their needs. Even Lerner's argument for an equal distribution of income is ultimately not an argument about income, but about our ability to satisfy our needs with the objects we can acquire with this income.

Socialist labour token proposals assume that prices correspond to the socially necessary labour time required to produce an item (Marx 1999a, Part 1). Prices are thus tied to the production cost of goods in terms of labour time and are independent of supply and demand. Market socialists, on the other hand, have suggested that market clearing prices, which create a balance between supply and demand, would yield a more efficient distribution of consumer goods (Dickinson 1930; Dickinson 1939, 60-64; Lange 1936, 57; Lerner 1944, 7-22).

A similar proposal was made by the liberal political philosopher Ronald Dworkin, who suggested that prices and distribution be determined in a competitive auction in which each participant has an equal number of tokens which can be used to bid on items (Dworkin 1981). Dworkin considers his auction to resemble an economic market and thus argues that markets are not only compatible with but necessary for economic equality. But since the auction does not rely on the principle of exchange, I will argue that there is only a superficial resemblance between Dworkin's auction and markets. An auction-like mechanism is thus compatible with a non-market socialist economy.

This chapter will discuss whether token prices determined by the conditions of production

(such as labour values) or a competitive bidding process (as in Dworkin's auction) are preferable for an industrial socialist economy. The first section deals with Dworkin's auction and the reasoning behind it. My adoption of Dworkin's auction thought-experiment is in many ways a misappropriation. Dworkin was not a socialist and I leave out Dworkin's hypothetical insurance scheme, briefly discussed in the previous chapter, which was central to his overall conception. I nonetheless agree with Dworkin on one central point: an auction-like determination of token prices is important in order to insure that an equal distribution of income leads to an equal distribution of actual items. This is a reason for adopting market-clearing prices in addition to the efficiency concern of market socialists.

The second section investigates the conditions under which the subjective valuations formed in an auction yield preferable results to prices based on an objective cost system of valuation, such as labour values. While there are hypothetical conditions under which objective cost prices are adequate and more straight-forward, these conditions do not hold true in an industrial economy. A socialist industrial economy in the 21st century should thus adopt a competitive pricing mechanism for consumer goods. Cost valuation may play an important part in production planning, but it should not be the decisive factor in short-term token price determination. In the next chapter, I will discuss how both cost valuation and market-clearing prices may play an important role in determining the mix of consumer products that should be produced.

The third section will then discuss tokens from the perspective of Modern Monetary Theory. In the discussion of Dworkin's auction, I argue that the auction does not resemble a market because it does not rely on exchange and that the tokens in the auction are not money because they 'do not circulate' (Marx 2007, Chapter 18). We can nonetheless notice certain parallels between tokens and modern fiat money as understood by Modern Monetary Theory. I will argue that while fiat money represents circulating IOUs that can be used to pay taxes, socialist tokens are non-circulating IOUs that can be redeemed for consumer goods.

5.1 Dworkin's Auction

Dworkin's auction proposal (Dworkin 1981; Dworkin 2002, 65-73; Dworkin 2011, 356-358) is interesting for two reasons. First of all, it contrasts with socialist labour token proposals as discussed by Marx (1999a, Part 1), which use labour values as token prices. Secondly, Dworkin (2002, 66) argues that his auction resembles real-life markets, with the tokens being the equivalent of money, and that markets are thus not a hindrance but a precondition for equality. In this section, I will argue that the auction differs from markets in that it is not based on commodity exchange. The auction is thus compatible with a non-market socialist system. Furthermore, there are good reasons, some of them identified by Dworkin, for making use of an auction-like mechanism, as opposed to labour value pricing. These reasons equally

apply to distribution in a socialist planned economy.

Dworkin (2002) considers a group of ship-wreck survivors that find themselves stranded on an uninhabited island and asks how they should divide the resources they find on the island equally amongst themselves. He suggests that any distribution should pass the envy test, meaning that no survivor prefers someone else's bundle of resources taken as a whole. On the one hand, the envy test is supposed to ensure that the egalitarian demand that people be given equal concern is met. '[I]t satisfies the widely held egalitarian view that an individual is disadvantaged compared to others if she enjoys less wealth than others because of the circumstances in which she lives (e.g. living in an area with less fertile land than others enjoy), rather than because of her ambitions' (Clayton 2000, 67). If two people prefer one bundle over another, but only one of them gets access to the bundle they both deem more desirable, then they are not being treated as equals. The envy test avoids such inequalities. The second virtue of the envy test is that it 'satisfies the liberal concern that egalitarian justice must be sensitive to the diverse goals pursued by different individuals' (Clayton 2000, 68). The envy test is formulated in terms of preferences of individuals, so it is in line with a liberal anti-perfectionist outlook. It could, however, easily be reformulated in terms of objective needs. In this formulation, the envy test would be satisfied if no individual would have their objective needs better satisfied with someone else's bundle.

The most obvious way to satisfy the envy test is by ensuring that everyone receives an identical bundle. In this case, no one can prefer someone else's bundle over their own because they are the same. However, Dworkin identifies two potential problems with this solution. First, it might not be possible to divide resources into identical bundles because they are not infinitely divisible. There might only be one goat on the island and dividing it will significantly compromise its use. Furthermore, identical bundles might just be one of several feasible sets of bundles which satisfy the envy test. Some people may be less satisfied when using this set of bundles rather than another and thus feel cheated. While they would not envy others bundles, they would envy them for the choice to go with a set of bundles that benefits them. By simply going with one of the envy-free distributions over another, people are not being treated as equals.

In order to satisfy this egalitarian demand, Dworkin suggests that the survivors auction off the resources on the island. As a means of bidding, each survivor is given an equal amount of clam shells or some other kind of token which is abundant in adequate amounts to ensure that everyone's reserves of tokens are sufficiently divisible for the purposes of the auction. Dworkin now imagines prices and bundles being determined in a Walrasian auction (Dworkin 1981, 287).

Rather than items being auctioned off one after the other, a Walrasian auction simultaneously determines prices and the according distribution for all items. The objective of the auction

is to balance supply and demand. This means that a) all items will be sold and that b) every participant willing to buy a certain amount of an item at its assigned price is able to do so. To achieve such a Walrasian equilibrium, the corresponding prices, which may also be referred to as market clearing prices, have to be found. One way one might imagine this being done is through a trial and error process. An auctioneer starts with an arbitrary set of prices and determines the demand for the various items. She then gradually adjusts them in an attempt to increase or decrease demand so that it approaches supply. Once the demand for all items is equal to their supply, equilibrium has been reached. Alternatively, we might assume that the auctioneer already knows for each participant in the auction how much of each item they will buy for every possible set of prices. Instead of the trial and error process, she now immediately deduces equilibrium prices.

The result of the auction will satisfy the envy test because any participant could have used her tokens to acquire anyone else's bundle. To further make sure that the auction process takes every participant's interests into account equally, Dworkin imagines that any participant can demand that some part of a resource, like a piece of land, is auctioned off separately. The resulting distribution satisfies Dworkin's egalitarian demands since it gives equal concern to everyone's preferences between envy-free distributions. By deciding how to divide the resources up for auction and how to bid they had an equal ability to impact the outcome of the auction. As such, the auction provides a baseline for what constitutes an equal division. This is complemented by Dworkin's hypothetical insurance scheme, which was briefly discussed above.

[Postema \(1987\)](#) noted that Dworkin's motivation for making use of an auction differs from the virtue economists often find in a Walrasian-type auction. 'Economists typically find Walrasian equilibria attractive for efficiency reasons. Allocations determined by such equilibria from initial equal endowments are both envy-free and pareto-efficient' ([Postema 1987](#), 74). [Heath \(2004\)](#) argues that by not considering this aspect of the auction, Dworkin misunderstood its significance. Rather than simply ensuring an envy-free distribution, '[t]he auction simply takes a prior envy-free allocation and makes it Pareto efficient' ([Heath 2004](#), 314). In other words, what is significant about the auction is not simply that it ensures an equal and envy-free distribution, but that resources are allocated in a way that considers individual preferences for various products. More specifically, Pareto efficiency means that there is no possible distribution which constitutes an improvement for one participant without making another participant worse off. Such considerations may provide additional reasons for using an auction, rather than for example identical bundles, as the use of set bundles does not take into account peoples differential preferences for various resources.

Dworkin himself makes it clear that his consideration of such matters is a result of his concern for treating people as equals. A distributional mechanism other than an auction does not only risk being inefficient, but also unequal, even when starting from an equal distribution of

tokens. However, as Heath notes, the degree to which an allocation of resources effectively serves people's needs or preferences may be seen as an important consideration independently of and in addition to a concern for equality. While this may not have been Dworkin's own motivation for introducing the auction, it can provide an additional motivation for making use of it. Overall, we thus have two reasons for making use of an auction to determine an adequate distribution of resources; equality and efficiency.

Both of these reasons are compatible with Lerner's argument for income equality (Lerner 1944, 25-30) which we discussed above. While the argument from decreasing marginal utility of income provided the reason for distributing income in an equal way, the auction provides a mechanism which distributes items to individuals in a way that is both efficient and maintains equality. But the auction can in principle also work to maintain a distributional pattern should income be distributed in an unequal manner, such as when some people have traded off part of their income for additional leisure time. In that case their share of the items on auction will not be equal, but proportional to their share of the income. We can imagine that those with a reduced income have already spent part of their equal share of tokens on additional free time.

While Lerner presented his argument as being strictly about the distribution of income, the demand for equality justified by this argument is not satisfied unless this income also translates into equal shares of the material goods used for need satisfaction. An obvious violation of this might be if some citizens were asked to pay more tokens for the same items than others. While all citizens would have the same amount of tokens to spend, they would end up with a highly unequal distribution of actual stuff. Clearly in such a situation the reasoning behind Lerner's call for equal distribution of income would not be satisfied and redistribution would be in order from those with a larger share of provisions to those with a smaller share, who would struggle to satisfy even more basic needs.

The spirit of Lerner's argument would also be violated if all citizens paid the same price for items, but only some citizens would actually get the items that they desire - perhaps because they made it to the shop before the items sold out. The latecomers, though starting out with the same number of tokens, would end up with products that they deem to be less satisfactory.

These examples show that we must pay attention that the conservation of equality is maintained as tokens are redeemed for goods. Dworkin's auction can be understood as a mechanism meant to ensure that the shares of material goods remain equal given an equal distribution of tokens. The prices of goods are given by the market clearing rates yielded in the auction. I will argue in the next section that this is sensible because they thereby adequately reflect items' decision-relevant opportunity cost. This differs from Marx's labour token proposal in which the token price of items is measured in terms of the socially necessary labour time needed to produce them. We will consider this contrast in detail in the next section.

For now, I will consider whether the auction resembles actual markets as Dworkin claims. This might make any similar distributional mechanism incompatible with a socialist economy which is not organized around market principles. Dworkin understands his argument for the auction as being an argument for ‘an economic market of some form’ (Dworkin 2002, 66). The obvious commonality of markets and his auction is that prices in a market may also be determined by competitive bidding. However, his auction differs from markets and even from real-life auctions in a crucial way: markets are based on the principle of exchange. When someone uses money to buy something on a market or acquire something at a real auction, that money passes into the property of the previous owner of the product being purchased. Receiving something of value in exchange is the motivation for goods being offered on the market in the first place and any bidding or bargaining is done over how much has to be given to the original owner in exchange. The principle of exchange is an essential aspect of what makes a market.

Dworkin’s auction does not include any exchange at all and can thus hardly be considered an example of an economic market. The resources on the island have no previous owner from which they could be bought, and the tokens being used to bid for them have no value beyond the single use in the auction and do not remain in circulation once they have been used.

Just as the auction only superficially resembles a market, the tokens only superficially resemble money, which circulates (more on the similarities and differences between tokens and money in Section 5.3). When money has been used to buy something, the seller can then use the money to purchase something else and it is usually only for this purpose that the seller entered the exchange relationship in the first place. Dworkin’s tokens, on the other hand, might be passed on to whoever has assumed the role of the auctioneer, but the auctioneer cannot expect to go on to exchange the tokens for anything of value. Nor were the resources on the island the auctioneer’s to begin with.

The distinction between Dworkin’s auction and a market is important for two reasons. First, it shows that Dworkin thinks that his thought experiment justifies something which it does not - the use of economic markets. But furthermore, it shows that Dworkin’s auction is not principally in contradiction to economic systems not based on markets, such as Marxian-style socialism. In fact, the auction should bring to mind a commonwealth distributing previously commonly-held goods to its citizens, rather than the exchange of property between private individuals on a market. When faced with the question of how a socialist society should distribute consumer products, but not productive resources, to its citizens, Marx also considers a solution based on tokens:

In the case of socialised production the money-capital is eliminated. Society distributes labour-power and means of production to the different branches of production. The producers may, for all it matters, receive paper vouchers entitling them to withdraw from the social supplies of consumer goods a quantity corre-

sponding to their labour-time. These vouchers are not money. They do not circulate. (Marx 2007, Chapter 18)

Under Marxian socialism, the means of production are under social control and individuals are compensated for their labour contributions by tokens which represent a certain amount of time worked. These tokens can then be used to acquire goods with an equivalent labour value, i.e. products which take the same amount of time to produce as the tokens represent. Unlike money, these tokens do not circulate. Once tokens have been used they have fulfilled their purpose. This is equivalent to Dworkin's clamshell tokens, which are gathered for the purpose of the auction and then cease to have any function once the auction is completed.

Unlike Dworkin's tokens, Marx's labour vouchers are meant to represent a unit of an objective value base – labour value. This difference will be discussed extensively in the next section. The reason that Marx stresses that his tokens do not circulate is to be found in his analysis of capitalist exploitation. While Marx understands exploitation to be taking place in the realm of production, this is facilitated by the exchange of private property (Marx 2008, 161-320). Any economic regime that is based on exchange thus runs the danger of giving rise to exploitative social relations.

5.2 Subjective vs Objective Valuation

Both Dworkin's auction and market socialist proposals (Dickinson 1930; Dickinson 1939, 60-64; Lange 1936, 57; Lerner 1944, 7-22) make use of competitive prices which reflect the consumer demand for various goods. This differs from Marx's view (Marx 1999a, Part 1) that labour vouchers, which use labour time as a basis for pricing, ought to be used. The vouchers reflect labour time in two ways. First, they are given out in proportion to labour time contributed with some specified amount deducted as a tax for public expenditure (see Section 4.3). This differs somewhat from Dworkin's auction, which assumes a strictly equal distribution. That tokens reflect labour time contribution reflects Marx's opposition to exploitative labour. Taxes aside, workers would get paid the full value of the product of their labour. On the other hand, it reflects the need for incentivising people to work, which Marx assumes to persist in the first stage of communism, while wealth is not yet sufficiently abundant.

The second way in which labour vouchers reflect labour time is in the pricing of consumer goods. The token price of a consumer good, according to Marx, represents the labour time necessary for its production. This is a significant difference compared to the pricing mechanism of the auction, as it ties prices to an objective valuation base: labour values. While labour values, like other attempts of objective valuation, reflect the conditions of production, the auction relies on individuals' bids for these items. It can thus be said to be in the spirit of the subjective theory of value as it has become popular in economics with the rise of marginal-

ism and the neoclassical school, which states that the value of a good does not depend on any property of the good or the conditions of its production, but on the subjective importance people place on it (Menger 1976, 120). Dworkin notes that prices in the auction represent to the individual ‘a background of information about the actual cost their choices impose on other people’ (Dworkin 1981, 288). In other words, it is not just one individual’s subjective evaluation that is reflected in prices and her choices, but also the subjective evaluations of other bidders.

There is a very good reason that the ship-wreck survivors on Dworkin’s island cannot make use of labour valuation of the island’s resources and thus have to rely on a system of subjective valuation through some process of bidding. The reason is that the resources on the island are not produced by labour (or in any other way) and can thus not be assigned such values. They are not confronted with the task of distributing the continual yield of social production, but instead must distribute the resources they find on the island upon their arrival. These resources represent a one-time gift from the gods and not the product of the continuous labour necessary to reproduce individuals and society as a whole. They are not products at all.

Having recognized this difference, we will have to ask ourselves what system of valuation is more fitting for a socialist industrial society distributing consumer products to its citizens. Was Marx right in endorsing a system based on an objective unit such as labour time? Or should the citizens of a socialist commonwealth adopt a system closer to Dworkin’s auction? The following twist on Dworkin’s island thought-experiment is meant to illustrate that under certain conditions the use of valuations which reflect production conditions can be perfectly adequate for the distribution of consumer products. However, I will later show that these conditions are too idealised and objective cost valuation is thus inadequate for consumer prices.

In an industrial economy consumption goods are produced and there is a degree of choice about which products to produce. So, let us change the thought-experiment somewhat to reflect this. Instead of survivors of a ship-wreck being stranded on an island on earth, we will consider the crew of a starship in the science fiction universe of Star Trek that is stranded on a deserted planet. In the Star Trek Universe, humanity has developed replicators, machines which can turn energy into all kinds of items imaginable, including food. We will assume that the crew either finds such a replicator on the planet or has been able to save one from their ship.

With the replicator, the crew can produce any consumption good they might desire, but each consumption good requires a certain amount of energy to produce, depending on the kind of product. We will assume that the replicator comes with a table showing the amount of energy necessary for each product, so the crew is aware of the energy cost of each item. The energy available to the crew to produce consumption goods is limited. In addition to the replicator,

the crew found a single solar power unit, which produces a continuous amount of energy. We will assume that this is the only source of energy they have available and that they are unable to construct further energy production units. We will further assume that the replicator will not be used at full capacity, so that machine time is no constraint on production. The crew can produce as much as they like, as long as they have the necessary energy. Energy thus represents the only constraint on production.

It would make little sense for the crew members in the thus described scenario to auction the products of the replicator. There is a much easier way to ensure that all crew members get an equal share and are perfectly happy with the kinds of items they receive. In place of an auction, crew members could be assigned a share of the available energy which they could turn into items of their choice. Energy (rather than labour) would in this scenario represent an appropriate basis for an objective valuation of the products. Since the replicator will produce whatever it is told to produce, there is no need to make use of an auction to achieve an equal distribution. As long as the available energy is evenly distributed among the crew, the distribution of products will meet the envy test, since any crew member could have used her share of the energy to let the replicator produce anyone else's bundle. Moreover, all crew members can determine the composition of their bundle themselves, meaning the bundles will reflect individual preferences. Economists will be delighted to discover that any resulting distribution will also be Pareto optimal. So there really is no reason for the crew members to make use of an auction.

Marx thought that labour time, not energy, should serve as a valuation base. In our current time and for the foreseeable future, human labour is needed for production. It is only based on this assumption that Marx's labour voucher proposal makes sense. We can adapt our hypothetical scenario so that labour vouchers and labour pricing would be the best way of distributing resources. Simply imagine that the crew members do not have the luxury of a solar power unit available and instead must work to produce energy, perhaps by mining coal. It can now make sense to award workers energy for usage with the replicator based on their labour contribution, rather than uniformly. This allows individuals to choose freely whether they would rather be able to consume more energy or spend more time being idle, in line with Section 4.2.

Marx describes such a system from the perspective of an individual worker:

He receives a certificate from society that he has furnished such-and-such an amount of labor (after deducting his labor for the common funds); and with this certificate, he draws from the social stock of means of consumption as much as the same amount of labor cost. The same amount of labor which he has given to society in one form, he receives back in another. (Marx 1999a, Part 1)

In the replicator scenario, the individual would be able to use the certificate to receive an equivalent amount of goods from the replicator. The equivalency is here measured through

the energy produced by the workers' labour. Only resources designated for the 'common funds' (Marx 1999a, Part 1) are deducted from this (see Section 4.3).

If there are concerns fuel resources may deplete (or perhaps that excessive coal-based energy production may lead to adverse effects on the planet's climate) the crew members might decide that energy usage needs to be limited, in order to conserve fuel (or the planet's climate) for the future. A possible way the crew might deal with this would be to limit the maximum energy usage per person. This would mean that at a certain point additional labour does not entitle one to further consumption products (see Section 4.2). With or without such an environmental constraint, there is no need for an auction to determine an adequate distribution of resources in the scenario where the crew members must labour in order to produce energy either.

In the desert planet example, if an adequate distribution can be achieved without making use of subjective valuation, then why should socialists care about Dworkin's auction? A response in the tradition of the socialist calculation argument (see Chapter 6) might be that in a complex industrial economy with countless different production inputs, energy or labour time do not provide an adequate measure of cost. That does not necessarily mean there cannot be another production-related system of valuation that could be used, and I will discuss Mises argument in detail in the next chapter.

A more sensible argument against production-related pricing of consumer goods can be formulated around the concept of decision-relevant opportunity cost. When deciding whether a measure of value is adequate for pricing, we should consider whether the values are an accurate reflection of the decision-relevant cost of the items. Cost should be understood to mean opportunity cost. When prices reflect decision-relevant opportunity cost, consumption decisions will take into account the missed opportunities that result from consumption. The equilibrium prices in Dworkin's island auction are meant to represent this opportunity cost which the appropriation of an item has on the other survivors (Dworkin 1981, 288). On the desert planet, energy prices are an adequate measure of opportunity cost, as any energy used to produce an item can no longer be used to produce something else. But what about a present-day industrial economy? Are objective cost valuations an adequate measure of opportunity cost for distribution in real life economies? I will argue that that this is not the case, because at the point of distribution original cost is often no longer decision-relevant.

The decision-relevant opportunity cost takes only those costs into account that are affected by the choice. Consider a company in a capitalist market economy that has already bought and paid for a new machine and now has to decide how to use the machine to generate the highest possible return. The price that was paid for the machine does not factor into the decision, as it has already been paid and the purchase cannot be undone. Instead, the company will have to consider what other alternatives are available. For example, instead of using the machine for

production, they may be able to lend it out or sell it to some other company. The opportunity cost of using the machine for production is then given by the amount of money from lending or selling the machine that is missed out on. Where more than one alternative use is available, the opportunity cost is given by the best of those alternatives, i.e. the highest amount of money that could be gained through other uses. The price originally paid for the machine is not decision-relevant, as it was already paid regardless of what decision is made on how the machine is used.

For distributional purposes a measure of opportunity cost is important for both reasons of efficiency and equality. Distribution decisions have to reflect that an item might also be needed elsewhere. This is to ensure that items are used to satisfy the most urgent needs. This can be seen as a matter of efficiency. But using decision-relevant cost is also needed for maintaining equality, as it is only in this way that equality is measured in a unit which reflects the real cost (in terms of forgone need satisfaction) that is inflicted upon others. Equality should thus be measured in these terms.

In the case of socialist distribution, an objective measure of value that considers the conditions of production does not adequately reflect the decision-relevant cost of products at the time of distribution, because the costs of production have already been borne. In particular, we will see in the following that production cost inadequately deals with time delays and scales of production.

Dworkin's shipwreck survivors cannot make use of objective valuation as the resources on the island are not produced. The survivors have no choice in what resources are on the island and they must find a way of distributing those that happen to be there. For this the auction serves fine. The starship crew members are in a different situation as their consumer products are produced and they have absolute freedom of choice about what kinds of consumer products are produced. Reality is somewhere in between. Whoever controls the means of production (in a socialist society they would be under public control) is in principle free to decide what to produce with them. But production is not on-demand as with Star Trek's replicators. For most products, consumers or producers cannot simply decide what to produce almost simultaneously or just prior to consumption. Production processes take long periods of time, with early steps necessary for production often being undertaken years in advance of final consumption.

Consider a power plant which may be expected to run for 40 years or more. Its construction commenced decades before an end-consumer wakes up one morning and decides to switch on the light in her bedroom. While someone had to decide at some point whether to build the power plant, we have to ask ourselves how to distribute energy and other products after the fact, since current decisions will no longer have an impact on the construction of a power plant which has already been built. In other words, the construction cost is not decision-relevant

for energy production and distribution after the power plant has already been built.

In the case of a small time-delay between production and consumption, the use of objective value pricing might still be adequate. Consider the replicator is malfunctioning such that it produces items one week after an order is placed. The crew members could still decide on an individual basis what they want to consume, but they must do so one week in advance. If the period is longer this will become increasingly difficult. Consumers may be able to estimate on an individual basis what they need in the week to come, but it is much more difficult to plan months or years ahead on an individual basis. Societal planning is much more appropriate in these instances. Instead of each individual having to be able to predict what they will need in the next year, it would be much better to estimate the average consumption needs for various products in society. This requires less detailed prediction since it is sufficient to estimate the number of shoes that will be needed in the coming year, not who will be wearing them. There is also a distributional aspect to this. Someone who inaccurately thought their shoes will last them for more than a year will be less likely to be punished for it by having to go bare foot if social planning of consumption is used. Consumption products would be produced and then distributed to those who actually need them at the time they become available.

Any prediction of future consumption needs will inevitably deviate to some extent from actual needs. Shoes can be over- or underproduced whether production is planned in the economy as a whole, as it would be under socialism, or only within individual enterprises, as it is in a market economy. The question that arises is by what mechanism to distribute a product if less (or more) of it has been produced than is demanded at production cost price. In such a case, any measure of the original production cost does not adequately represent the decision-relevant cost of consumption. Marx did not address this possibility of items having been over- or underproduced. What if more workers are willing to use their labour vouchers for shoes than there are pairs of shoes? Or what if there are more shoes than workers willing to leave the necessary amount of labour vouchers? Should the remaining shoes be left unused even if there are people that could make good use of them but are unwilling to use the according number of labour tokens for them? Fixed pricing, which is what Marx proposed, inevitably leads to under- or overutilization of some products. Furthermore, it undermines the role of income in distribution, since when items are in short supply, tokens will be irrelevant in deciding who gets these items. Even an equal distribution of tokens might in this way lead to an unequal distribution of items. Market clearing prices, on the other hand, adapt to ensure that consumption matches current levels of production and they adequately reflect the opportunity cost of consumption.

So far, we have considered the delay from a planning decision to a finished product as a reason that consumer products have to be distributed after the fact of production. A further reason for this is based on the scale of production decisions. In a contemporary industrial economy, decisions are not made on an individual level. In the Star Trek example, each crew

member was able to decide individually what she wanted to have produced by the replicator. Contemporary industrial economies, on the other hand, make use of large-scale production. A planning decision will never involve a single pair of shoes for a single individual. Instead, planners have to make decisions about entire production plants and supply chains.

While such decisions must reflect the (anticipated) consumption need of individuals, it cannot be made for each individual separately. By the time a power plant is online, its construction costs will already have been paid and the cost of its operation may be relatively insensitive to the amount of electricity produced. In such cases, it is infeasible to produce just a few watts more or less (or shoes for that matter). So, once a production or power plant becomes operational it is a question of distributing its entire product and not of micromanaging the level of production to match demand. The decision-relevant opportunity cost of the consumption of an individual watt or shoe is thus not adequately reflected by average production cost.

While in our hypothetical scenarios objective valuation might serve well as pricing, for the most part, distribution has to be done on the basis of a given level of production. In this sense, real-life distribution is much closer to Dworkin's island example, where a given set of resources has to be distributed to the shipwreck survivors. In such cases, it makes sense to use a mechanism like Dworkin's auction to determine market clearing prices. These more adequately reflect the decision-relevant opportunity cost of consumption and they result in a balance of supply and demand.

We have now seen how a socialist society should distribute tokens and how it should determine the token prices at which goods can be acquired. Tokens are distributed according to labour contributions for the working population. For those unable to work, tokens are provided without a work requirement. The tokens can be used to acquire items at prices which should ideally be set at market clearing rates, i.e. those rates which balance supply and demand. Some goods and services like education and healthcare would be provided outside the token system and could be accessed either at will or on the basis of individual needs.

Socialism is distinct from other political frameworks in that it limits the items that can be held in private to goods meant for direct consumption. Any socialist take on distribution must thus be limited to consumption goods, as the means of production are held in common. In the discussion of his island example, on the other hand, Dworkin supposes that the shipwreck survivors 'do not yet realize [...] that it might be wise to keep some resources as owned in common by any state they might create' (Dworkin 2002, 67). So, while Dworkin shows no principled opposition to the idea of having some resources held in common, at least in the case of the island the auction applies to all resources, including productive resources such as land. Whatever a survivor produces on the land she acquired in the auction she gets to keep for herself. So, anything being produced using the resources is not directly subject to the

auction and so the auction by itself does thus not ensure equality beyond starting conditions.¹

In the case of the island, this suggests that the auction is a one-time event. Resources are auctioned off and then each is left to manage her own resources as she sees fit. A socialist auction, on the other hand, would necessarily be repeated regularly, as the consumer goods that are produced every day must be continuously distributed. The means of production are publicly owned, and production is organised socially. Productive resources such as land are thus not subject to the auction – at least insofar as that land is to be used for productive purposes. Instead, the continuous stream of consumption goods produced could be distributed to consumers using a mechanism similar to Dworkin’s auction.

In the scenario closest to Dworkin’s auction the consumption goods produced in a given time period would be auctioned off in a singular event which has consumers bid on the products. Having regular events at which all consumption goods for a time period are auctioned off may, however, prove to be impractical. A result comparable to the auction could also be achieved by controlling prices of consumer products towards their market clearing prices. Instead of having to participate in specific auction events, consumers go to shops or distribution centres or order online whenever they feel like it. The purchases of various products are monitored (either by wholesale managers or a computer algorithm) and prices for each item are gradually adjusted to achieve market clearing. This means that stocks will be used at the same rate as they are replenished through production. Items do not pile up unused, nor are consumers unable to acquire a product due to stock depletion even if they are willing to pay the appropriate number of tokens for it. Such an adjustment process towards market clearing prices in a socialist economy was proposed by market socialists like Dickinson ([Dickinson 1930](#); [Dickinson 1939](#), 60-64) and later by [Cockshott & Cottrell \(1993](#), 118-126). The simulation of a socialist economy presented in Chapter 7 also makes use of such a mechanism. But unlike in some market socialist proposals (e.g. [Lange 1936](#)), the use of such a market-like mechanism is limited to the distribution of consumer products and does not include productive resources.

5.3 Tokens as non-circulating IOUs

This section will take a close look at the nature of the proposed tokens from the perspective of Modern Monetary Theory. While I have noted an important difference between tokens and money — tokens do not circulate — we nonetheless can notice certain similarities between tokens and fiat money as described by Modern Monetary Theory.

In Section 5.1, I have argued that the tokens a socialist society might use for distributing consumer goods are not money, because they cannot be used for exchange. In modern market

¹Dworkin realizes this, which is why he suggests the auction include a hypothetical insurance scheme which allows participants to acquire insurance against future unfortune.

economies, money can be used for exchange through the processes of buying or selling. Buying and selling, which are two sides of the same coin, imply the exchange of money with some other commodity. If person A buys an apple from person B, this implies some sort of transfer of ownership. Person A receives an apple, while person B receives an amount of money in return. Such an exchange of commodities between private individuals would not be the basis of a Marxian socialist society and the use of such exchange transactions would be limited, either through legal means or by abolishing the necessity for them. Individuals might still exchange personal items on a small scale, but this would not be fundamental to the functioning of an economy with socialised production and might not involve use of the tokens, whose sole purpose is to distribute the products of the social economy directly to their consumers.

Preventing the use of tokens for exchange would be fairly simple if this is deemed necessary. Assuming that the tokens are recorded in some sort of public accounting system, this system would simply not allow individual users to transfer tokens from one account to another. Individuals could use the tokens recorded in their account to acquire consumer goods out of socialized production, but they cannot make payments to other users as they can in the modern banking system. Direct exchange of items or exchange using some form of makeshift money would be a lot more difficult to prevent, but there would be little sense in such interactions since production is under public control, and in most cases consumers will thus have to go through the official token system to receive these products. Exchange would thus likely be limited to things like secondhand items, personal services and contraband. What actions, if any, society should take to prevent such exchanges is a political decision that depends on the nature of the exchanged items, circumstances and the political judgement of decision makers. Some form of flea market where people can acquire used clothing or furniture would be unlikely to threaten the socialist nature of the economy and should likely be allowed or even encouraged in order to reduce demand for new items.

Having once again established that the tokens in a socialist economy differ from money in that they are not meant to be used for exchange, we can nonetheless notice certain parallels with modern fiat money, as understood by Modern Monetary Theory (MMT). Modern Monetary Theory ([Wray 2015](#)) is a heterodox theory of economics that is heavily influenced by Chartalism ([Knapp 1921](#)) and Functional Finance ([Lerner 1943](#)). According to MMT, money is essentially an IOU that the issuer of the currency (a state) promises to accept as payment for taxes or fees ([Wray 2015](#), 48-50). The reason that money is valued (even when not backed by gold) is that people and corporations need to pay their taxes. The state that issues the currency can create new money by spending it into existence. This means that a state can afford to buy anything that is offered in the state's own currency. It cannot run out of money, as the state itself issues the money. This does not mean that states should spend money at will, since anything that the state buys will not be available for the private sector to buy and this could push up prices. The spending budget of a capitalist state has to consider what resources

should be mobilized for the public sector, and what resources should better be left for the private sector.

According to MMT, the purpose of taxes is not to generate monetary income for the state, as monetarily sovereign states, i.e. states which issue their own currency, can spend in that currency at will. Instead, taxes are primarily needed in order to create demand for the currency, so that the private sector is willing to accept the currency as payment. Progressive income taxation also has a redistributive character, as it takes resources away from the rich. Additionally, taxes might be used to create disincentives, as is the case with so-called sin taxes. Proposed carbon taxes, for example, are meant to disincentivise the use of fossil fuels in order to encourage a shift towards alternative products or production methods ([Ghandi & Cuervo 1998](#)).

From an accounting perspective there are two fiscal operations that the state can make. First, it can spend money into existence. This would involve the central bank typing in a number designating a certain amount of money into a computer so that it appears either on the government's account at first or directly on the account of a payment recipient. This is simply a matter of changing the numbers on the central bank's digital record sheet. Secondly, the government can tax money out of existence by having the central bank delete money from the accounts of taxpayers, which is again a matter of keystroke. In reality, these operations are somewhat more complicated, with private banks playing an intermediary role between the central bank and customers and a complicated, legally constructed relationship between the treasury and the federal reserve in the case of the United States ([Wray 2015](#), 71-81). Modern Monetary Theorists nonetheless believe that public spending and taxing are for a monetarily sovereign government essentially operations of creating and deleting money by keystroke. As the issuer of currency, the state has a different relationship to money than a mere user of that currency. It is not dependent on income or borrowing in order to spend. Interactions between individual users can nonetheless be seen as exchanges where money passes from one hand to the other. Money is thus a kind of IOU issued by the state which circulates in the economy as it is being used for exchange between private agents and for settling of payments in the private sector.

MMT is a matter of significant controversy in economics and far from a mainstream view.² But whether or not MMT accurately describes modern monetary systems, we can certainly use the perspective of MMT to shine light on the proposed socialist token system. Like money in the MMT view, tokens can be created at will by the institution charged with keeping the record of the tokens, which we can call the central bank after its real-world equivalent. When private individuals use tokens to acquire items out of the social product, the according number of tokens is deleted from their accounts, as Modern Monetary theorists claim is being done

²For: [Wray \(2015\)](#), [Fullwiler et al. \(2012\)](#), [Tymoigne & Wray \(2013\)](#). Against: [Fiebiger \(2012\)](#), [Lavoie \(2013\)](#)

when taxes are paid to the government.

MMT claims that demand for money is created because people have to pay taxes and dues to the government. In the proposed socialist system, individuals would need tokens in order to acquire consumer goods. Wray discusses a similar scenario as an alternative way for the government to create demand for its IOUs:

[L]et us say government monopolizes the water supply (or energy supply, or access to the gods for salvation, etc.); it can then name what you need to deliver to obtain water (or energy, religious dispensation, etc.). In that case, if it says you must obtain a government IOU, then you need government IOUs – currency – to obtain water in order to avoid death by dehydration. (Wray 2015, 140)

In a socialist society, all or most production is monopolized under public control. This does not just include water or energy, but most consumer products that people cannot simply gather or create individually. Socialist society is thus in a perfect condition to issue IOUs (tokens) and to demand that individuals use these tokens in order to acquire a share of the social product. Individuals would thus have an interest in acquiring these IOUs and would be willing to work in socialist production in order to be issued IOUs. This way labour could be mobilised for the production of industrial goods and consumer products or for other fields of public interest, like education or healthcare.

In Chapter 4, I assumed that public expenditure would have to be resourced through a kind of tax. We can now see more clearly that this is not necessary. Since the means of production and natural resources are under social control, society does not have to “pay” anyone in order to use these resources in whatever way is deemed necessary. It only has to issue tokens to workers for their work, and such IOUs can be created at will. It is not necessary to levy taxes in order to credit the token accounts of workers at the central bank. It does not matter whether these workers are producing consumer products distributed through the token system, or whether they work in the healthcare sector where treatment is provided freely. Taxes are also not necessary in order to create demand for tokens, as this is already ensured because tokens are needed to acquire consumer products. Workers might be “taxed” in the sense that they would be expected to work a certain number of hours each week, which would not be rewarded with tokens. This is because everyone able to work should have a responsibility to take care of those who are not able to work and to contribute to the social provisioning of goods like healthcare. It is not that these goods could otherwise not be provided. Workers could also be credited for all the work that they do, and nonetheless some of the workers could be working in the healthcare sector and so on. Instead, expecting workers to work a certain amount for the community, i.e. without a token reward, is simply one possible response to the question of how the work necessary to provide public goods is to be distributed (see Section 4.3).

Just because tokens can be credited to individual accounts at will, does not mean that this does not have consequences or should be done indefinitely. Unless the issuing of additional tokens is backed by additional consumer products that can be acquired with these tokens, more tokens will lead to an increase in the token prices of consumer items. Assuming the basket of products available remains the same, an increased number of tokens in the accounts of consumers means that the consumers will likely bid up the prices of the limited products with their additional tokens. In the proposed socialist economic system, the mere issuing of tokens would not lead to an increase in the supply of consumer products. The issuing of tokens only effects how these consumer products are distributed and should be used to that end.³

In modern monetary systems, money can be accumulated as savings. In principle this could also be possible with tokens. Instead of using up tokens within a short time period after they are issued, consumers could save some of them and thus accumulate tokens over time. While they would not be able to accumulate any kind of interest on their savings, they might prefer future consumption over present consumption. They might also speculate that token prices for items will be lower in the future, for example due to productivity increases. However, allowing for such saving can lead to significant problems. Should consumers save a significant number of tokens in January and then use these excess tokens in February, February prices will be pushed up. This will negatively impact consumers who did not save and simply want a constant amount of monthly consumer products. In February they will be able to afford a lot less, as prices have been pushed up.

There is thus a good case for preventing the hoarding of tokens, by having tokens decay if they remain unused for some time. For example, tokens could only be useable for a time period of one month and be deleted after that time. Consumers might thus be allowed to apply for advanced or belated spending of tokens, but this would be limited in a way to ensure that an equal number of tokens is being used every month. Consumers might be able to use their January tokens in February, but only if an equal amount of February tokens is already being used in January. In other words, savings would have to be matched by advances for other consumers and vice versa. This would prevent instability in the overall price level and at the same time allow consumers to adapt their token use to their needs or save for larger expenditures.

[Marx \(1999a, Part 1\)](#) and also [Cockshott & Cottrell \(1989, 1997, 1993\)](#) assume that tokens should represent a certain amount of labour time. For Marx this representation is two-fold.

³In a market capitalist economy this might be different, as the creation of additional money through government spending can have a stimulating effect on the economy when production is not at full capacity. The increased supply of money thus does not necessarily compete for the same basket of products. Instead spending through the state or recipients of benefit payments or the like may lead to companies activating their unused productive capacity to produce additional products that can be bought with the new money. Functional finance and MMT thus suggest that government spending (relative to taxes) be linked to the performance of the economy, where employment numbers are seen as the main indicator for this ([Wray 2015, 200-201](#)).

First, tokens issued to workers represent a certain amount of time worked, from which a kind of “tax” must be deduced. Secondly, the token prices of consumer goods correspond to the socially average labour time necessary to produce them. In the case of [Cockshott & Cottrell \(1993, 118-126\)](#), token prices are adapted to demand but are nonetheless given in terms of a number of work hours. The linking of tokens to labour time is not necessary and under my proposal tokens would not be linked to a number of work hours. Instead, tokens are simply distributed according to the distributional patterns outlined in Chapter 4 and prices are adjusted towards market clearing prices as outlined in Section 5.1. While contributed labour time is an important factor in determining the number of tokens individuals are issued, it is not the only factor and there is no reason to denominate tokens in labour time. Labour constraints also have to be taken into account in economic planning, but this can be done separately, by directly considering the kinds and quantities of labour (as well as other resources) available in the economy. It is not necessary for tokens issued to consumers to be labour time denominated in order to take labour time into account as an important factor in planning decisions.

While Modern Monetary Theory describes money as a kind of circulating IOU issued by the state, the tokens of a socialist society can be seen as non-circulating IOUs. The promise behind these IOUs is not that they will be recognized as tax payment, but that they can be used to acquire consumer products out of social production. Unlike money, these IOUs do not circulate. They are not meant to be used for the exchange of goods between actors in the private sector, as production is under social control. They can only be used to acquire consumer items from the state, at which point the tokens are deleted from the consumer’s account.

5.4 Conclusion

We now have a complete picture of the distributional mechanism that a socialist society should adopt. Most consumer goods will be distributed through a token system. The tokens represent a kind of IOU which entitle the holder to a share of the consumer products out of socialised production. Unlike money, these tokens are not intended to change hands between private actors. Their sole purpose is to distribute the yield of socialised production to individuals.

For those able to work, tokens should be distributed based on labour contribution. This follows from the original assumption of equal distributions of tokens and labour time, once individuals are allowed to distribute tokens for additional free time. Those unable to work would be provided an appropriate amount of tokens without such a labour requirement, which is a recognition of the ‘from each according to his abilities’ part of Marx’s needs principle ([Marx 1999a](#), Part 1).

Some provisions, such as healthcare, should not be based on the token system. This is because people who need treatment because they are sick should not be worse off as a result. Their other needs do not become less important because they required treatment and their satisfaction should thus not be prevented through a requirement to redeem tokens for medical treatment. Medical care should instead be administered based on an assessment of the patients needs and be free at the point of use. Such provisions recognise people's differential needs as required by the 'to each according to his abilities' part of Marx's needs principle ([Marx 1999a](#), Part 1).

This chapter has argued that the rates or prices at which tokens can be redeemed for consumer goods should correspond to the result of a Walrassian auction. This is because the market clearing prices that result from such an auction best represent the decision-relevant opportunity cost of consumer goods. By using market clearing prices, we do not only ensure efficiency in the distribution of goods, but that the distributional pattern of tokens is conserved after tokens are redeemed for actual goods. It is after all not the distribution of some abstract unit of account that we should care about, but actual goods that can be used by consumers to satisfy their needs.

Contrary to what is claimed by [Dworkin \(2002\)](#), such an auction only superficially resembles a market, since it does not involve the exchange of private holdings. Furthermore, the use of such an auction can be limited to consumer goods and does not have to be extended to productive resources. Instead, it can be used to distribute socialised production's output of consumer goods to individual consumers. Nonetheless, Dworkin was correct in identifying such an auction with an equal distribution of resources. While market socialists ([Dickinson 1930](#); [Dickinson 1939](#), 60-64; [Lange 1936](#), 57; [Lerner 1944](#), 7-22) have touted the distributional efficiency of market clearing prices, the preservation of equality is an additional reason for them.

In this chapter, I have assumed that there is a fixed amount of consumer goods to be distributed and have ignored the possible decision-making process over the range of products and production methods. In the next two chapters, we will see how the market clearing prices for consumer goods can be used to determine changes in planning targets for consumer products. The distributional mechanisms discussed here are thereby closely tied to the planning processes that I will discuss next. They are also an essential part of the computational simulation of my model presented in Chapter 7.

Chapter 6

Economic Rationality: The Socialist Calculation Debate

This chapter considers the possibility of rational planning of production in a socialist economy. An influential objection to socialist economics, first formulated by [von Mises \(1920, 1922\)](#), is that there is no way to make rational economic decisions in a marketless economy. The debate that was triggered by Mises has become known as the socialist calculation debate, and several variations of the objection have been formulated since ([Hayek 1945](#), [Kirzner 1997](#), [Lavoie 1997](#)). In this chapter, I focus on Mises's original objection, because it raises interesting philosophical questions about the nature of economic rationality. I will be dealing with two distinct interpretations of Mises's argument ([O'Neill 1996](#); [O'Neill 2003](#), 112-128; [O'Neill 2006](#); [Greenwood 2006](#); [Greenwood 2007b](#); [Greenwood 2007a](#); [Cockshott 2010](#)) and relatively recent socialist responses to these respective versions of the argument ([O'Neill 1996](#); [O'Neill 2003](#), 112-128; [O'Neill 2006](#); [Cockshott 2010](#)).

While in the previous chapter we have dealt with the problem of distributing a given stock of consumer products to consumers, this chapter will consider what consumer products should be produced in the first place, and by what means. On the one hand, this chapter will dismiss the Misesian claim that economic rationality on such matters is in principle impossible under socialism, thereby refuting a major objection to socialist economic planning. On the other hand, by taking the Misesian concern for economic rationality seriously, I will sketch specific methods of planning which can be adopted under socialism in order to ensure a rational utilisation of productive resources.

The two interpretations of Mises argument presented here depend on two very different concepts of economic rationality. The first one, advocated by John O'Neill ([O'Neill 1996](#); [O'Neill 2003](#), 112-128; [O'Neill 2006](#)) and in the tradition of Mises's contemporary and adversary Otto Neurath ([1973c](#), [2004a,b,c](#)), takes economic rationality to be about the choice

of ends. Mises is attacked for having an algorithmic conception of such rationality, in which the deliberation of ends is reduced to a comparison of their supposed monetary value. Mises's argument against socialism is thus understood as being based on the absence of prices which might facilitate rational choice between competing economic ends. Only markets allow for prices, meaning that under (non-market¹) socialism a comparative evaluation of the various possible outcomes of economic decisions is impossible.

The second response to Mises's argument which will be discussed here is the linear programming approach of [Cockshott \(2010\)](#), which is in the tradition of the Soviet school of optimal planning around the mathematician Leonid [Kantorovich \(1960, 1965\)](#). While Kantorovich's linear programming approach to socialist planning was not developed in response to the western socialist calculation debate, but rather in response to the practical problems of planning the Soviet economy, Cockshott argues that Kantorovich essentially refuted Mises's case against socialism. The underlying understanding of the economic problem and economic rationality is in stark contrast to that of O'Neill. The economic problem is not understood as a choice between various possible outcomes or ends, but rather requires determining a production plan which utilises available resources to best fulfil a prespecified planning target. It is thus a question of finding the deployment of the means of production which best realises pre-set ends. Economic rationality is thus understood as instrumental rationality.

But the biggest challenge for proponents of socialism is judgements about multiple ends in light of diverse means of achieving those ends. It is thus precisely the combination of value judgement and instrumental rationality that needs to be addressed. I argue that this requires valuation of products which is based on the opportunity cost of these products, i.e. what could be produced instead of that product. This can be measured by the degree of plan fulfilment in a Kantorovich-type linear programming problem. Plan targets can be adjusted by comparing the market clearing prices of a product to its opportunity cost.

The chapter shows that Mises's legitimate concern about rational planning in a socialist economy can be addressed within a socialist framework. Mises has thus not shown a principal impossibility of rational socialist planning. Furthermore, I make a concrete proposal as to how rational planning could be facilitated. Practical planning methods can be derived from this which are further investigated using an experimental computer simulation in the next chapter.

¹So-called market socialism was developed in response to Mises and is thus not considered in his original argument, cf. [Lange \(1936\)](#)

6.1 Marx on Socialist Planning and the Austrian Response

Marx and his close comrade Engels argued for the establishment of a universal production plan (Engels 1962, Marx 2008). Individual enterprises would not compete on a market but follow the instructions of a production plan for the entire economy which is directed towards social goals. Enterprises would thus no longer buy or sell products but receive them or pass them on in accordance with the plan. Marx compares the economic decisions involved in the drawing up of such a plan with those of a Robinson Crusoe economy, the only difference being ‘that they are social, instead of individual’ (Marx 2008, 92). Being alone on an island, Crusoe has no use for the principle of exchange or money. ‘Necessity itself compels him to apportion his time accurately between its various uses. Whether one kind occupies a greater share of his overall activity than another, depends on the greater or lesser difficulties that have to be overcome in order to attain the intended useful effect.’ (Marx 2008, 91). In a similar way, a socialist society as a whole would have to decide how to make use of its labour and other resources in light of the various useful effects that can be achieved and the effort and difficulty involved in achieving them.

Engels (1962) gives us a somewhat more precise idea of what socialist economic planning might entail. Society ‘will establish the production plan in accordance with the means of production, including in particular the labour force. The useful effect of the different objects of utility weight against each other and against the amount of labour necessary for their production will in the end determine the plan’ (Engels 1962, 288). Engels anticipated, perhaps rather naively, that determining a plan in such a manner would pose no particular difficulty.

Mises’s calculation argument (von Mises 1920, 1922, 1981, 2008) objects to the Marxian notion of economic planning on the basis that it would be infeasible in an advanced society due to the complexity of the economic problems that need to be addressed. A decision between various uses of labour and the means of production, or, in Mises’s own terminology ‘goods of a higher order’ (von Mises 2008, 8), is relatively simple in the one-man economy of Robinson Crusoe. Mises admits that, ‘[i]t would not be difficult for a farmer in economic isolation to come by a distinction between the expansion of pasture-farming and the development of activity in the hunting field. In such a case the processes of production involved are relatively short and the expense and income entailed can be easily gauged’ (von Mises 2008, 8-9). But in a modern economy, there are countless economic alternatives to choose from and the useful effects of these are often indirect. Some products are not meant for immediate consumption, but only serve as production inputs for some other process. So, even if one is able to judge the immediate use value of consumption goods, the value of productive resources and their best use is not at all obvious.

Thus, Mises contended that,

the mind of one man alone—be it ever so cunning, is too weak to grasp the importance of any single one among the countless many goods of a higher order. No single man can ever master all the possibilities of production, innumerable as they are, as to be in a position to make straightway evident judgments of value without the aid of some system of computation. (von Mises 2008, 15)

While Marx and Engels believed that devising a production plan for an entire economy was a simple task of weighting up various useful effects and labour burdens, Mises argued that the complexity and sheer number of dependencies and substitutabilities of various productive resources made such an endeavour futile. Only calculation based on monetary prices, so Mises, allow for handling this complexity and taking into account the large variety of relevant factors. He concludes, that

in the socialist commonwealth every economic change becomes an undertaking whose success can be neither appraised in advance nor later retrospectively determined. There is only groping in the dark. Socialism is the abolition of rational economy. (von Mises 2008, 23)

If Mises is correct, then the socialist project of rationally planning production is doomed to fail. Later economists of the Austrian school have put forward further arguments against socialism that are in the tradition of Mises (Hayek 1945, 1981, 2002, Kirzner 1997, Lavoie 1997). Hayek's information argument suggests that the crucial thing about markets is that they are able to make use of dispersed knowledge. The central question of economics for Hayek is

how the spontaneous interaction of a number of people, each possessing only bits of knowledge, brings about a state of affairs in which prices correspond to costs, etc., and which could be brought about by deliberate direction only by somebody who possessed the combined knowledge of all those individuals. (Hayek 1981, 63)

The market economy manages to coordinate the economic activity of distinct individuals by transferring relevant information through the market-price mechanism, without any one individual having access to all relevant information (Hayek 1945). Socialist planning which does not rely on the market-price mechanism would, however, have to centralise relevant economic data in order to make rational economic decisions. For Hayek the problem for socialist planning is thus not one of complexity per se, but of being able to centralise dispersed information. However, such information is, according to Hayek, often of such a nature that

one cannot ‘recite [it] in detail or report [it] to a government agency’ (Hayek 2002, 13). Socialism fails, so Hayek, because relevant information needed for planning is missing.

Hayek (2002), Kirzner (1997), Rothbard (2009) and Rutland (1985) also stress the importance of entrepreneurship, which they think a socialist economy will lack. Hayek (2002) and later Kirzner (1997) developed the idea of the market as a discovery process. Since future market conditions are not known, competing entrepreneurs can test their hypotheses about what endeavours will be profitable. Hayek describes this ‘as a procedure for discovering facts which, if the procedure did not exist, would remain unknown or at least would not be used’ (Hayek 2002, 9).

I have decided to focus on Mises’s calculation argument here, since I have addressed Hayek and Kirzner elsewhere (Dapprich 2016). Mises is the influence for many of the later arguments and I thus think that addressing Mises’s calculation argument at least to some extent also addresses later variants. Furthermore, I think, perhaps somewhat controversially², that Mises’s original argument is actually the strongest challenge to socialism. Hayek remains vague on the kind of information that socialist planners might need and why it cannot be communicated to them. The model of socialism I propose in response to Mises only requires planners to have access to very specific information about available production techniques and inventories. This kind of information is not tacit and could easily be communicated.

The theory of entrepreneurial discovery (Kirzner 1997, Section IV) is fundamentally flawed too, because competition only decides which operations have been economical after the fact, when it becomes clear whether they have been profitable or not (Dapprich 2016, 20). Competition does not allow entrepreneurs to have better insight into future market conditions and thus does not ensure that production is more appropriate to those conditions. It thus does not lead to more informed production decisions than might be possible under socialism (Dapprich 2016, 20). While much more can be said on this, and while I do not expect proponents of Hayek’s position to be convinced by these brief remarks, I have nonetheless decided to focus the rest of this the chapter exclusively on interpreting and addressing Mises’s calculation argument.

6.2 O’Neill’s Interpretation of the Calculation Argument

In the following sections, I will discuss two interpretations of Mises’s argument and argue that both versions fail to conclusively discredit the possibility of rational planning under socialism. O’Neill (O’Neill 1996; O’Neill 2003, 112-128; O’Neill 2006) interprets Mises’s

²O’Neill (1996) for example argues that Hayek had the better argument

calculation argument as being primarily about the nature of rational choice. For O'Neill, Mises relies on an 'algorithmic' conception of practical rationality which led him to believe that 'rational choice between options requires their commensurability in terms of a single unit of value' (O'Neill 1996, 433). Deciding between two alternatives would require measuring both of them in terms of a common unit, which is handily provided by market prices. Rational choice boils down to a comparison of monetary values.

We can understand O'Neill's interpretation of and disagreement with Mises in terms of philosophical debates about commensurability (Anderson 1997, 1993, D'Agostino 2003, Chang 1997b,a, Regan 1997). Mises argues that commensurability of options (Raz 1986, 117) is necessary in order to make a rational choice. According to Raz (1986, 117), two or more options are commensurable or comparable vis-a-vis each other if each option is better, equal or worse than each other option. Furthermore, Mises suggests that only a numerical scale like monetary valuation can make this possible and that there is no viable alternative to monetary valuation in a socialist economy.

I understand O'Neill (O'Neill 1996; O'Neill 2003, 112-128; O'Neill 2006) to disagree with Mises on both the supposed inadequacy of non-monetary decision-making, as well as the supposed adequacy of monetary decision-making. He does not accept that commensurability is necessary for rational choice, instead suggesting that some process of political-ethical evaluation be used in making decisions (O'Neill 1996, 437). But not only is monetary valuation not necessary for rational choice, it is in fact inadequate, because it cannot capture the variety of factors relevant to a decision. In a sense, O'Neill thus believes the precise opposite of Mises. Any decision-process based on a single scale ought to be rejected and only direct deliberation about options, taking into account multiple relevant factors, is an adequate process for making decisions (O'Neill 2003, 114).³

There is some evidence that commensuration of options really was part of Mises's thinking. O'Neill quotes Mises's *Human Action*, where even individual decision making is thought to be impossible without monetary prices:

The practical man . . . must know whether what he wants to achieve will be an improvement when compared with the present state of affairs and with the advantages to be expected from the execution of other technically realisable projects which cannot be put into execution if the project he has in mind absorbs the available means. Such comparisons can only be made by the use of money prices. (von Mises 1949, 209)

This view on the role of monetary prices in decision making is in stark contrast to that of Neurath, another early participant in the socialist calculation debate and the main target of

³O'Neill (2003, 125) also proposes the use of more formal multi-criteria decision analysis as an alternative to monetary valuation.

Mises's arguments. Neurath adopted many of the ideas of Marx and Engels in the development of his moneyless administrative economy (Neurath 1973c, 2004a,b,c). Administration of the economy implies the setting up and execution of a universal production plan. The evaluation of plans is done in accordance with their effects on the conditions of life, which are not to be measured in money, but in-kind, i.e. in terms of the abundance of food, quality of housing, availability of education and entertainment and so on. While administrators might take into account statistics about available and used materials, energy and so on, Neurath believed that there ultimately are 'no units that can be used as the basis of a decision, neither units of money nor hours of work. One must directly judge the desirability of the two possibilities' (Neurath 1973c, 145). O'Neill agrees with Neurath that '[r]ational practical thinking need not involve any single unit that reduces decision making to a purely technical procedure. It requires ethical and political judgment' (O'Neill 1996, 437). He cites Neurath's discussion of coal mining, an example Neurath directly took up from Mises:

The question might arise, should one protect coal mines or put greater strain on men? The answer depends for example on whether one thinks that hydraulic power may be sufficiently developed or that solar heat might come to be better used, etc. If one believes the latter, one may 'spend' coal more freely and will hardly waste human effort where coal can be used. If however one is afraid that when one generation uses too much coal thousands will freeze to death in the future, one might use more human power and save coal. Such and many other non-technical matters determine the choice of a technically calculable plan . . . we can see no possibility of reducing the production plan to some kind of unit and then to compare the various plans in terms of such units. (Neurath 1973a, 263)

Following Neurath, O'Neill argues that the existence of non-economic goods, such as environmental goods, demonstrates that decision making cannot be reduced to monetary valuation. In a passage from *Socialism* that is cited by O'Neill, Mises appears to admit this:

If, for example, we are considering whether a hydraulic power-works would be profitable we cannot include in the computation the damage which will be done to the beauty of the waterfalls unless the fall in values due to a fall in tourist traffic is taken into account. Yet we must certainly take such considerations into account when deciding whether the undertaking shall be carried out. (von Mises 1981, 90)

Rather than seeing this as a simple contradiction to Mises's own position in *Human Action*, O'Neill understands Mises to advocate 'putting a price on an unpriced good' (O'Neill 2003, 117). In order to consider non-economic goods, Mises takes it to be necessary to assign them a monetary value, a practice O'Neill rightfully objects to.

To see why O'Neill is right in this rejection, let us consider another non-economic good considered in the literature on commensurability ([Anderson 1997](#), [Chang 1997a](#)), friendship. Is it possible to assign a monetary value to friendships? If a person is willing to end a friendship in order to gain an amount of \$10,000, this might be seen as a demonstration that she values the friendship less than the specified amount. But what it merely shows is that when presented with the two options 'maintain friendship' or 'terminate friendship and receive \$10,000' she will choose the latter over the former. This does not mean that she values the sum of money more than the friendship, because the options are more complex than could be captured by any amount of money. In particular, it depends on what she can and intends to do with the money. If she needs urgent life-saving surgery which she can otherwise not afford, her decision might be different than if she does not. Or maybe her life-long dream was to travel to West Africa to see her favourite animal, the western black rhino, in the wild. Since the western black rhino is now extinct, taking the money to be able to pay for travel expenses might be significantly less appealing to her.

The point is that when deciding between the two options she is being confronted with, she is not simply measuring the value of the friendship in monetary terms. She has to make a complicated deliberation about the various possibilities in both scenarios. The outcome of such a deliberation does not only depend on the sum of money being offered, but also on the various possibilities that might arise with access to this money under present circumstances. In particular, it depends on what can be acquired with that money, and which of those things she might be interested in. In the end the deliberation is not simply about the 'monetary value' of friendship or even the particular friendship that is at stake.

Instead, it is a deliberation about two (or more) possible futures. In one the friendship is maintained, but surgery or travel cannot be afforded. In the other possible future, the friendship is lost, but surgery can be paid for or travel afforded. Even if the idea of sacrificing a friendship for monetary gain is not met with outright rejection, money only plays a very indirect role in such a deliberation by virtue of being the medium of exchange required to pay for surgery, travel or whatever else one might use it for. So, whether the person in question accepts the money by itself says very little about how much she values friendship. Even if it did reveal the monetary value of friendship, the determination of the price would be highly circumstantial and ultimately the result of her deliberation about the various possible futures and not the other way around. So, we can conclude that knowledge of the monetary value of non-economic goods is not a necessary part of such a decision-making process. A rational decision in a scenario as the one described is always based on a direct comparison of the possible outcomes. The same can be said for the environmental problems considered by Neurath and Mises.

[Greenwood \(2006\)](#) offers an alternative interpretation of Mises. He argues that the above cited waterfall passage precisely demonstrates that Mises recognised the existence of un-

priced goods, which nonetheless need to be considered in decision making. According to this interpretation, monetary calculation is a precondition of decision making because it informs us of the opportunity cost (OC) of preserving the waterfall. '[K]nowing OC is a necessary part of making a rational choice about the future of the waterfall' (Greenwood 2006, 16), but it is not sufficient. That knowledge of the opportunity cost, but not the imaginary value of a non-economic good, is necessary for making a decision is certainly true and in a market economy this opportunity cost may be given in the form of money. Without knowledge of the opportunity cost, we remain in the dark about what our options are. In our friendship example, it is only because of knowledge of the offer being \$10,000 that we can consider what might or might not be acquired if the offer were to be accepted. This does not mean that the same would have to be the case in a socialist society, not based on monetary exchange.

Consider a scenario in which socialist planners or the democratic electorate of a socialist society must decide between preserving a waterfall and utilising it to generate electricity for local schools and hospitals. Knowing the opportunity cost in this scenario does not require assigning a monetary value to schools and hospitals having electricity. The provision of electricity itself is the opportunity cost of preserving the waterfall. While the decision in such cases does not have to be easy, monetary valuation does not help to make it.

Having to decide between various objectives is a constant reality for both individual actors and policy makers. In a market economy, monetary calculation might guide policy making because it can represent a resource constraint, but it does not help making a choice on whether it is education or environmental conservation that should take priority when facing any particular choice. Such a decision can only be made by a direct comparison of the possible outcomes. If O'Neill's interpretation of Mises's argument is indeed accurate, then he is certainly right in rejecting it. Monetary valuation is not a precondition of rational choice, and so a lack of market prices does not negate the possibility of rational choice under socialism.

6.3 The Calculation Problem as a Problem of Complexity

Greenwood (2006, 70) also introduces the useful distinction between instrumental rationality and ethical judgement to the debate. For O'Neill the calculation argument was primarily about the ethical deliberation of ends. He offers an important defence of the view that a choice between conflicting objectives does not necessitate their commensuration in monetary form. But arguably the more serious challenge to the feasibility of rational socialist planning comes from the consideration of the vast number of ways we might attempt to achieve whatever goals we are dedicated to. The problem we face is thus one of instrumental rationality, not of ethical judgement, and it is a problem that is born out of the complexity of human economic activity. That complexity was central to Mises's argument becomes apparent when he admits

that under certain limited circumstances monetary calculation might be dispensed with. In a passage cited above Mises acknowledges that a farmer in economic isolation might make economic decisions directly, without the use of monetary values, because the ‘processes of production involved are relatively short and the expense and income entailed can be easily gauged’ (von Mises 2008, 8-9). He was also willing to concede that a socialist society might be able to make rational decisions about consumption goods, because their usefulness is directly apparent:

It will be evident, even in the socialist society, that 1,000 hectolitres of wine are better than 800, and it is not difficult to decide whether it desires 1,000 hectolitres of wine rather than 500 of oil. There is no need for any system of calculation to establish this fact: the deciding element is the will of the economic subjects involved. But once this decision has been taken, the real task of rational economic direction only commences, i.e., economically, to place the means at the service of the end. (von Mises 2008, 16)

Here it also becomes clear that the problem Mises seems to be primarily concerned with is one of instrumental rationality. While it is a relatively simple choice between one consumption good or another (ends), economic decisions are mostly concerned with the utilisation of productive resources (means). Decisions to be made do not simply concern whether it is wine or oil that is more urgently needed, but how to make use of available natural resources, labour and higher order goods to achieve the most desirable outcome. The term higher order goods refers to production goods. Mises uses it to emphasise that many products only play a very indirect role in consumption. Consider the production of some part of a machine that is used in the manufacturing process of some other machine, which is in turn used to produce farming equipment needed by wine farmers. The choice between an amount of oil or an amount of wine is relatively straightforward when compared with the choice between some amount of this machine part and some other part. The impact on the quality of life of consumers is highly indirect. It may nonetheless be of utmost significance.

While Mises accurately identified this problem, it is not at all clear that he is correct in his claim that only value calculation using monetary prices is able to offer a solution to it. I take value calculation to be one particular kind of economic calculation that rests on the assigning of values to all items. Individual production decisions are then made by comparing the values of production inputs with that of production outputs to determine profitability. Beyond identifying the problem of complexity and offering an account of how value calculation offers a solution to it, Mises does little to establish that it is the only possible solution.

Mises does discuss Otto Neurath’s (Neurath 1973c, 2004a,b,c) notion of calculation in-kind. Neurath proposed that an adequate allocation of labour and resources to various production purposes is determined by calculations in terms of physical quantities of the various products and resources, rather than any values which might be assigned to them. This would require

the establishment of a universal social statistic, encompassing all kinds of economic goods. Neurath, like O'Neill after him, often focused on the in-kind evaluation of ends. For example, he saw precedence for in-kind calculation in systems of healthcare and education that are not based on the profit motive. The benefit of the provision of healthcare or education to a community is not necessarily determined in monetary form. Nonetheless some kind of evaluation of the contribution of a hospital or a school is possible, be it in terms of the number and kinds of illnesses treated, or the number of students taught, and the quality of education provided. While this is true for healthcare and education outcomes, teachers, doctors, drugs and medical equipment are nonetheless paid for with money. It is ambiguous to what extent Neurath realised or did not realise that the economic problem went beyond the evaluation of ends, but he certainly saw the science of in-kind calculation as only just emerging and he should not be seen as having provided a full account of what in-kind methods a socialist economy might use. Further development of the discipline was needed before it could be properly applied in a socialist economy. That Neurath did not propose a complete model of non-monetary economic calculation should not lead us to believe that the task cannot be achieved. Mises was too quick to dismiss the possibility.

6.4 Linear Programming as an Alternative to the Market

Computer Scientist W. P. Cockshott (2010) has recently proposed the linear programming approach to planning, as developed by Soviet mathematician Leonid Kantorovich (1960, 1965), as a possible response to Mises's calculation argument. Kantorovich's work was not in response to Mises but was rather prompted by the practical problems facing planners in the Soviet Union. Nonetheless it is worth considering his ideas in the context of the calculation debate. Kantorovich was, like Mises, concerned with the utilisation of resources under socialism. He begins his study of the problem with a description of some of the deficits he witnessed in the Soviet Economy:

[C]onsiderable losses take place even now- idleness of labour and equipment, and losses in raw materials and fuel, owing to unsuitable programmes, rush work towards the end of the plan period and delays in supply, the freezing of materials in surplus stocks and in protracted construction - these are also evidence of the lack of sufficiently rational planning. (Kantorovich 1965, xxiii)

Overall, his assessment of the Soviet economy reminds one of the problems that Mises predicted would arise in a socialist economy. Recall that Mises argued that, in a socialist economy, there are no indicators as to whether resources might be better utilised elsewhere. Kantorovich commented on this issue:

No less significant are the indirect losses caused by the improper utilization of resources. As they are not recorded they are less noticeable. For example intricate equipment is used for simple work, with low efficiency, while in other places, where it could be most effective, the absence of this equipment causes delays or necessitates the use of primitive methods. This is also true of materials. Particularly frequent are the losses due to the lack of flexibility in allocation, resulting in the lack of small quantities of any necessary material becoming a hindrance to raising output. (Kantorovich 1965, xxiii)

It is probably fair to say that Mises would feel somehow vindicated by such a description of a socialist economy. For Kantorovich, these problems are, however, not problems inherent in the socialist system. They are rather the result of ‘imperfect production planning and economic accounting, caused by inadequate methods’ (Kantorovich 1965, xxiii). Kantorovich set out to develop improved methods of planning which would allow for a better and more effective use of resources. For this he identified two problems that would need to be solved:

The correct choice of method in the production of a given output or the completion of a given operation. [...] (2) The allocation of the programme and of the resources available among individual enterprises and operations, etc. (Kantorovich 1965, xxiii-xxiv)

It needs to be determined which methods of production should be used and on which scale. Furthermore, it needs to be determined how resources should be distributed to various operations making use of the specified methods. However, neither of these questions can be answered independently. To find the correct distribution of resources, it needs to be determined what methods should be used, because the resources to be used depend on the method. At the same time what methods are effective or not depend on what resources are required, available and do not have an alternative better use. Kantorovich also recognized that these problems cannot be solved for an individual enterprise in isolation as the ideal plan for one enterprise depends on those of others:

The solution of similar problems will depend upon the operating conditions of many other enterprises and upon general economic conditions. If transport is overloaded, local raw materials should be used irrespective of the losses this may involve. If the means available for capital investment are very limited, plans for a new boiler must be abandoned in spite of its superiority. (Kantorovich 1965, xxiv)

In his attempt to solve the problem of resource utilisation in a socialist economy, Kantorovich contributed significantly to the founding of linear programming for which he was later awarded the Stalin and Nobel prizes. In the following passage, also cited by Cockshott, Kantorovich summarises his discovery:

I discovered that a whole range of problems of the most diverse character relating to the scientific organization of production (questions of the optimum distribution of the work of machines and mechanisms, the minimization of scrap, the best utilization of raw materials and local materials, fuel, transportation, and so on) lead to the formulation of a single group of mathematical problems (extremal problems). These problems are not directly comparable to problems considered in mathematical analysis. It is more correct to say that they are formally similar, and even turn out to be formally very simple, but the process of solving them with which one is faced [i.e., by mathematical analysis] is practically completely unusable, since it requires the solution of tens of thousands or even millions of systems of equations for completion. I have succeeded in finding a comparatively simple general method of solving this group of problems which is applicable to all the problems I have mentioned, and is sufficiently simple and effective for their solution to be made completely achievable under practical conditions. (Kantorovich 1960, 368)

Standard mathematical analysis is unable to solve problems of optimal allocation of any significant complexity. It was developed for application in mechanics and even in this context fails to provide solutions to problems containing three or more bodies (so called three-body or n-body problems). Kantorovich succeeded in showing that instead of standard analysis, resource allocation problems can be solved by making use of an alternative algorithmic method which would yield a definite solution after a finite number of steps. While mathematical analysis works by solving differential equations, Kantorovich's method works by starting with an arbitrary, feasible plan and successively improving it until an optimal solution is reached.

Similar methods to that of Kantorovich were independently developed in the West (Dantzig 1954) and have since been turned into software tools.⁴ Where they are used in the context of a capitalist market economy, they tend to serve the purpose of calculating the solution to a problem that either maximises profit or minimises cost in monetary terms. Such a usage is very much in line with Mises's concept of value calculation. Kantorovich's approach is notable in the context of the calculation debate since it works completely independently from monetary prices. Cockshott writes:

What was significant about Kantorovich's work was that he showed that it was possible, starting out from a description in purely physical terms of the various production techniques available, to use a determinate mathematical procedure to determine which combination of techniques will best meet plan targets. He indirectly challenged von Mises, both by proving that in-natura calculation is possible, and by showing that there can be a non monetary scalar objective function: the degree to which plan targets are met. (Cockshott 2010, 171)

Cockshott points towards two ways in which Kantorovich's approach differs from traditional value calculation. First, the aim of the calculation is not to maximise profit. Instead, plan

⁴One example is the freeware `lp_solve` ("[lp_solve](#)" n.d.).

targets are specified as a mix of products at fixed proportions. The goal is then to find the plan which maximises production output at the thus specified proportions. Secondly, Kantorovich does not commence with a list of values assigned to each item. Instead, his starting point is a physical description of the economic problem at hand in terms of the inputs and outputs of available production methods and the available productive resources (quantity of raw materials, number of machines, available hours of labour power etc.). In this sense it is a fulfilment of Neurath's quest for a science of in-kind calculation. The particular method reproduced as a formal algorithm by [Cockshott \(2010\)](#) does make use of what Kantorovich referred to as Objectively Determined Valuations (ODVs). However, these valuations are not the starting point, but rather a mathematical tool used in the process of finding an optimal plan. Other methods for finding an optimal plan were proposed by [Kantorovich \(1965\)](#). A detailed tutorial on one of Kantorovich's methods is offered by [Cockshott \(2010\)](#). For us linear programming shall simply be a black box in which we enter a specification of the available production methods, resources and the planning target and receive an optimal plan, that is a plan which maximally fulfils its target. The question is whether this demonstrates the possibility of instrumental economic rationality under socialism.

The answer is clearly yes, at least for a certain kind of specified end. The end must be formulated in the form of set proportions of production output. But if objectives can be formulated in this way, then Kantorovich's method or other Linear programming methods can be and are being used to solve resource allocation problems and thus finding the best way to allocate resources to achieve some specified goal. For this they do not have to rely on market prices and can thus also be applied in a socialist economy. This directly refutes the instrumental reading of the calculation argument by showing that instrumental economic rationality does not depend on markets.

6.5 Combining Instrumental- and Value Rationality

We have seen that the applications of both instrumental rationality and rational deliberation about ends are individually consistent with a socialist economy. But the greater challenge lies precisely in the combination of the two. In this section, I will show that the combined problem of choosing between competing means in the light of competing ends is a more significant challenge to the prospect of economic rationality under socialism, but that this problem, too, can be overcome.

O'Neill ([O'Neill 1996](#); [O'Neill 2003](#), 112-128; [O'Neill 2006](#)) is right in arguing that the choice between two ends does not necessitate expressing the value of either in monetary terms. Nor is, as Kantorovich's optimal planning approach demonstrates, monetary calculation necessary for optimising towards some specified end. But economic problems often represent a combination of the two: the choice of ends depends on what it takes to achieve

them, and the extent to which the choice compromises other ends. We must not simply decide between two options in isolation, e.g. preserving the beauty of a waterfall or using it to produce electricity. Both have implications for the economy at large and the fulfilment of other goals. Using the waterfall to produce electricity will bind up machinery and labour power that cannot be used elsewhere. It is when we consider both how things are produced and the choice of ends simultaneously that cost becomes relevant. A similar point was made by [Steele \(1992\)](#) who argued that Mises had conceded too much when admitting that socialist planners might be able to determine what consumer goods are needed:

A society that cannot value factors ipso facto cannot value final goods—therefore a society that can value final goods can value factors, so Mises’s unwarranted concession about consumer goods contradicts his economic calculation argument. Without knowing what consumer goods cost to produce, the administration is in no position to select the kind and number of consumer goods. ([Steele 1992](#), 123)

His objection to Mises’s concession addresses what he identifies as a fundamental problem of Austrian economic theory, namely the notion that the prices of consumer products are determined by the behaviour of consumers, the effect of which is then passed on to factor prices:

This mistake derives historically from the Austrian school’s battle to insist that ‘prices determine costs’ against the old notion that ‘costs determine prices’. The Austrians were right, in the sense that the costs of production of a consumer good derive from the competing demand for factors stemming from the demand for other consumer goods. But since the price of a good is partly determined by the available stock, it follows that consumer goods prices are not determined independently of the prices of factors. If we suppose, as a mental experiment, that there is some change in the supply of a factor, say a great increase or decrease in the availability of petroleum, then clearly this will change all prices, of factors and of final goods. ([Steele 1992](#), 124)

While Steele’s general point against Austrian theory might be correct, does it invalidate Mises’s willingness to make the concession? In the example Mises gives, it is assumed that the opportunity cost of choosing to produce 1000 hectolitres of wine is that 500 hectolitres of oil cannot be produced. Beyond the lost opportunity of not being able to use factors to produce something else, it is not clear why cost should be considered in such a consumption decision.

There is one factor of production that is somewhat of an exception. Labour should not only be economised due to its limited availability, having to work can also cause a significant toll on the well-being of workers. Not only would they usually rather be doing something else, work can also cause significant physical and mental harm. When committing to produce any

consumption good, the labour burden necessary to produce it should thus be considered in accordance with Engels' proposition that '[t]he useful effect of the different objects of utility weight against each other and against the amount of labour necessary for their production will in the end determine the plan' (Engels 1962, 288). Another cost that might have to be considered is environmental impact. It is, however, perfectly conceivable that a decision between one set of consumer goods and another is made by directly comparing the use values and impact on workers and environment of both.

But is this the kind of problem that socialist planners might face? Even if consumption choices are left to planners, rather than individual consumers, planners will not simply have to decide between these ends, they will at the same time have to determine what things can be produced with available resources in the first place. In other words, any planning process will not start off with a number of given consumption bundles to choose from. Planners might calculate one or two feasible plans and the corresponding consumption bundles, but the sheer number of imaginable plans means they will not be able to consider all possibilities. This would require a kind of "brute force" method, in which all imaginable plans are calculated and then evaluated based on their anticipated consequences. This is immensely complicated and likely to be impractical.

The alternative is to use the maximisation approach of Kantorovich (1960, 1965). A computationally much simpler method can be used to directly yield a plan that is in some sense optimised. An optimised plan is simply one that maximises some prespecified objective function under given constraints. The choice to be made is over the objective function that is to be maximised. Once this has been decided upon, an algorithmic method like Linear Programming can be used to find the optimal allocation of resources and methods of production. As discussed above, Kantorovich (1960, 1965) suggested that a plan target be formulated in terms of proportions at which various goods ought to be produced. For example, the plan target might specify that for each table, 4 chairs, 20 bundles of wheat, etc. ought to be produced.

In choosing the plan target, cost does have to be taken into account. If planners were to consider increasing the production of chairs, by changing the corresponding entry in the plan target from 4 to 5, they would have to consider the impact this would have on the production of other goods. The additional resources dedicated to the production of chairs can no longer be used to produce tables or other things and the product of other goods would thus be diminished. The choice of what consumption goods to produce or at what proportions to produce them is no longer just a direct comparison of use-values but will have to consider some measure of cost of production. This cost must reflect the extent to which the production of one use-value limits the production of other use-values. This way any decision will reflect alternative production options.

Cockshott & Cottrell (1993) have suggested a mechanism by which cost might be taken into

account. This mechanism is supposed to address the ‘criticism commonly levelled at the Soviet-type economies [...] that they were unresponsive to consumer demand’ (Cockshott 2010, 187). But it also demonstrates more generally how instrumental rationality and value judgement may be combined in a socialist economic framework. The underlying problem to be solved can be understood as follows: while the use of an instrumentally rational plan may be ensured by Linear Programming given a plan target specified as a set of proportions of the various products to be produced, it remains to be seen how this plan target may be determined. O’Neill may be right that rational choice about ends is possible in the absence of market valuations, but the determining of target production proportions is somewhat different from the comparison of a small number of options. There is a potentially infinite number of proportions that could be chosen and there must thus be some way of determining reasonable proportions at which products ought to be produced.

Cockshott & Cottrell (1993, 118-126) assume that day to day consumption choices are made by consumers. But this consumption behaviour must be guided by some form of costing. Consumers cannot simply decide based on which consumption goods would benefit them the most, but they must also be made to consider the cost of that consumption. Furthermore, these day-to-day consumption choices must then be somehow reflected in production planning. The mechanism they suggest for making production responsive to consumer demand consists of three steps.

In the first step, wholesale managers try to determine market clearing prices, as I have also argued for in the previous chapter. In the second step, the prices at which goods are being sold can now be used as a signal on which to base the choice of target outputs, somewhat comparable to the way the price mechanism is supposed to function in a market economy. If the price of a product is high, the target output should be increased. If the price is low, the target output should be reduced. But, as Cockshott writes, ‘this then raises the problem of how one determines that a price is high or low. High or low relative to what?’ (Cockshott 2010, 188). In other words, what is an adequate measure of cost in a socialist economy? For this, Cockshott & Cottrell (1993, 118-126) have suggested the use of labour values, i.e. the socially necessary labour time embodied in the products. Target outputs will be adjusted depending on the degree of divergence between market clearing prices and labour values. After the target outputs for all items have been adjusted and the according proportions calculated, the optimal plan for the new plan target can be calculated in the third step.

Cockshott and Cottrell’s proposal invites the criticism commonly directed at labour time calculation and the labour theory of value in general: that productive resources other than labour are insufficiently considered.⁵ It is, however, not immediately clear if this line of argument is valid against their proposal. Limitations on production other than labour are, after all, con-

⁵One of the first formulations of this criticism was by von Böhm-Bawerk (1949), who had a significant influence on Mises.

sidered as constraints in the linear programming problem. The optimal solution calculated will thus be one that is feasible given the available means, including limitations other than labour power.

But the question is not only whether a plan is feasible with available resources. We must also ask whether resources are adequately reflected in the costing of products and the plan targets which are derived, in part, from that cost. Consider a case where consumers are offered the choice between two products A and B which require an equal amount of labour time, but B requires a larger amount of some resource, such as land, which cannot be reproduced at will and whose scarcity constitutes a limitation to the expansion of production. Surely B should be priced at a higher level than A to encourage consumers to choose A over B, so that the limited resource of land can be used for other purposes. Using labour values as the centre of gravity towards which prices are to be regulated inhibits appropriately shifting the plan ray towards products which require less scarce resources. The scarcity in question does not have to be a material constraint, it might also be deliberate for environmental reasons, as a cap on greenhouse gas emissions would be. It is desirable that products based on greenhouse gas emission are priced higher, as might be the case if a global carbon tax were introduced in the current market capitalist economy, so that their price properly reflects the forgone opportunities in using limited emissions in some other way. This way the choice of the planning targets would appropriately reflect the carbon footprint.

While the Towards a New Socialism (TNS) model (Cockshott & Cottrell 1993) does consider resource constraints and environmental constraints in the determination of an optimal plan, it is not clear that these are sufficiently reflected in values, prices and the choice of the planning target. The model nonetheless shows how instrumental and value rationality might be combined given an adequate measure of cost.

6.6 Measuring Cost in a Socialist Economy

The next two sections will deal with problems or open questions that arise directly from my response to the calculation problem. This section will consider what makes a measure of cost adequate and how cost should be determined. We have to consider this, because whether the TNS model (Cockshott & Cottrell 1993) constitutes a solution to the combined problem of economic rationality depends on whether there is an adequate measure of cost that can be used in a socialist society. As in the previous chapter, cost should be understood as decision-relevant opportunity cost. When faced with the choice of producing more of a particular product, what has to be taken into account is what is lost by making that decision. Without knowledge of what the alternative to an option is, one cannot hope to make a rational decision about whether the option should indeed be chosen.

In the previous chapter, we have considered the decision-relevant opportunity cost at the point of distribution. I argued that the conditions of production were not decision relevant at this point, as production of the items to be distributed has already been completed. Now, however, we are considering what to produce in the first place. For this decision, production requirements are clearly relevant, since they determine what else could be produced with given resources. But in the end opportunity costs are not given by any used up resources (like raw materials or labour), but by the finished products forgone by utilising resources in one way rather than another. An exception to this is that there are cases with benefits to leaving resources idle. These cases are considered separately in the next section.

So, the opportunity cost for the production of any item is the consequent reduction in output of other items and their intended useful effects. But in order to compare prices and value, as in the TNS model ([Cockshott & Cottrell 1993](#)), we need values measured on a single cardinal scale. We are, however, dealing with a multitude of different goods and possible reductions in their output that could facilitate the expansion of production of some other good. How could we possibly hope to reduce this to a single value on a single scale? Fortunately for us, Kantorovich's plan target already provides us with such a scale ([Kantorovich 1960, 1965](#)). We simply need to measure the extent to which the production of a certain item reduces the output of other items at the proportions specified by the plan target.

Consider a proposal to use labour, machinery and material to build a school. The resources could no longer be used to produce other items and this reduced availability would have to be taken into account in the constraints of the linear programming problem. The stricter constraints lead to a reduction in the maximised value of the objective function, i.e. in how much else can be produced. This reduction, compared to the scenario where the school is not built, can be seen as the opportunity cost of building the school. Cost is thus simply the difference in the value of the optimised objective function of a linear programming problem.

In the TNS model ([Cockshott & Cottrell 1993](#)), consumer prices are compared to values in order to adjust the plan target. We can calculate values for consumer items that represent their opportunity cost thus understood. In order to do this, we simply consider how the resources that go into making one unit of the item could otherwise be used to increase production output at plan target proportions. We pretend that one unit of the item is available freely (without any resources needed in its production). This means less resources have to be put into production of this type of item and are freed up for production of other items. This increases overall output. The degree to which it increases output can be seen as the value or opportunity cost of one unit. This is because one unit being available for free is equivalent to that unit simply not having to be produced at all in terms of resource usage. A more technical explanation of this process of valuation is given in the next chapter.

Now consider a scenario in which current production of both beer and lemonade is 1000 units.

Let us assume that the market clearing price for one unit of either is one token. This means that at a price of 1.0 token, exactly 1000 units of lemonade can be matched to consumers willing to use an according number of tokens and the same goes for the 1000 units of beer. But now let us assume that the opportunity cost (after normalisation to make it comparable to token prices, see next chapter) for one unit of lemonade is 0.9, while for beer it is 1.1. This means less people are willing to pay the actual opportunity cost of beer than are currently consuming beer. At the same time there might well be more people willing to pay from their tokens an amount equivalent to the opportunity cost of lemonade (0.9) that are currently purchasing lemonade due to its slightly higher price (1.0). This means a relative reduction in the production of beer and increase in the production of lemonade is appropriate and future plan targets should be adjusted accordingly.

As it stands, opportunity cost (understood as difference in the value of the objective function of a linear programming problem) should be seen as the ideal centre of gravity around which market clearing prices are to be regulated via an adjustment of the plan target. It is in principle possible that other measures, for example labour value, can be used as proxies for real cost and could thus be used instead. Calculation of such values may be computationally simpler and thus preferable for practical reasons. The conditions under which labour values may function as a proxy for opportunity cost are investigated experimentally using a computer simulation in the next chapter.

The simulation will in particular look at the effect of environmental constraints, such as a cap on greenhouse gas emissions, on costs. A problem that market economies face is that the environmental degradation which results from economic activity is not usually reflected in production cost. However, there are various proposals to use market-mechanisms so that environmental cost is better considered. The two most common proposals are emissions-trading and a carbon tax (Bohm 2000, Stavins 2001, Ghandi & Cuervo 1998). Such proposals are meant to increase the relative cost of emission-intensive products and economic processes and thus shift the economy towards more environmentally friendly alternatives, while ensuring economic efficiency through market mechanisms.

This raises the question of how a similar result can be achieved in a planned economy that does not rely on market mechanisms in the same way. The proposed measure of opportunity cost valuation offers a potential solution to this problem. A constraint that limits the total emissions of the economy will lead to an increased opportunity cost of emission intensive products. This changes the centre of gravity towards which clearing prices are regulated, resulting in a shift in the plan target towards more environmentally friendly products. Results from the simulation presented in the next chapter demonstrate this effect.

6.7 Leaving Resources Idle

The previous section and the therein proposed concept of valuation rested on the assumption that the lost opportunity of producing a good is other goods which cannot therefore be produced. There may, however, also be benefits to leaving resources unused, benefits which are lost no matter what they end up being used for. This section will thus consider how the possibility of leaving resources idle can be considered in planning decisions.

One example for why resources might be left idle is given by Neurath and was mentioned earlier (Neurath 1973a, 263). Should coal be used now? Or should some of it be left for future generations so that they will not freeze to death? Today we might instead ask whether coal should be used when this has severe negative effects on our planet's climate (IPCC 2014). A further example of a resource which should at least partially be left idle is labour power. When people have to work they have less free time and enjoyment, so it might in many cases be better to keep a limit on work time rather than producing more stuff. In the previous chapter, I have argued that workers should be able to substitute part of their material consumption for more leisure time. So, some of the potentially available labour power in a society should remain unused.

Socialist society will thus have to decide what resources should be available for economic use and which resources should best be left idle. Once this has been decided, the resource limits can be worked into the constraints of a Linear Programming problem and consumer products can be evaluated for their opportunity cost in terms of other products as described in the previous section. The decision process would thus consist of two steps:

- Step 1) Decide what resources should be used rather than left idle.
- Step 2) Decide what use of those resources yields the greatest benefit.

There is an apparent paradox in this two-step process. In order to decide what resources should preferably be used rather than left idle, it is required to already know what the best possible use of those resources would be. This is necessary in order to compare the consequences of resources being left idle to the best utilisation of them. But the best possible use of those resources is only known after step 2, which requires knowledge of any resource constraints. This apparent paradox is dissolved once we consider that any production plan is calculated first and only executed afterwards. This means we can calculate an optimal plan in step 2, without having to have made a final decision on useable resources. Planners could try out a variety of resource constraints to see what the resulting optimal plan would be and then judge which of these plans would be the most desirable.

Let's say it is being considered to reduce coal mining in order to preserve coal deposits for

future generations or to reduce carbon emissions. Planners would separately calculate plans with and without the tightened constraint on coal mining, or with a number of constraints which vary in how much coal can still be used. Planners would then be able to directly compare the outcome of these plans in terms of the amount of product made available by them. It would then have to be judged whether the benefits of reducing coal usage justify any resulting reduction in output by directly comparing the possible scenarios.

So, while in step 2 we can directly calculate an optimal plan with the help of an algorithmic optimisation method, the determination of resource constraints requires a direct comparison of a number of possible plans. While we might prefer a similar method to step 2, where all possibilities (not just a limited number) are considered and we are directly given an optimised solution, it seems unlikely that such a method can be used to determine what the right trade-off between resource or environmental conservation and industrial production is. This is also the case because environmental concerns have long term consequences that go far beyond the immediate preferences of individuals and thus require political and ethical deliberation about the importance that should be placed on the environmental transformation of the planet.

In the case of restrictions on labour usage, the decision about contributed labour time can to a large extent be left to individual workers, who can make the decision based on their individual needs. As described in the previous chapter, workers can forgo some of their income in favour of reduced work hours. They can make decisions by a comparison of the benefits of the additional free time and the goods that could be acquired using the forgone tokens. As long as prices can be assumed to be relatively constant, then it is clear what goods cannot be bought if a worker decides to reduce her work hours. The worker is thus in a good position to deliberate about what choice to make. If prices can be expected to change, there might be more uncertainty in the outcome, because workers will not know what goods they might be able to acquire with the income in question. In such cases, the decision would involve a degree of speculation and uncertainty, but workers could nonetheless decide on their working hours based on expected outcomes.

From the perspective of economic planning, the overall amount of available labour power or different types of labour power, has to be considered when devising a production plan. This must exclude any labour power that is intentionally left unused to allow workers more leisure time. The available labour power can simply be built into the constraints of an optimisation problem, as described earlier, which is then solved to find an optimal plan. The only requirement for this is that planners have a reasonably good idea of how much labour power will be available over the planning period. This does not necessarily mean that planners will have to know which individual workers will be available during that time, but only how many workers and how many work hours in total. To ensure a more accurate estimate, it might be necessary that workers declare a desired reduction in work hours a sufficient time ahead, so that planners will have a better idea of available work hours and how many hours are to be

left for leisure.

As we have seen, a comparison of the benefits of using a resource with its opportunity cost can also be used to determine whether it would be better for a resource to be left idle. For environmental concerns, this must be a political deliberation as it effects society at large. But for an individual choice of a work/life balance, this might also be left to individual workers to decide.

6.8 Conclusion

The chapter discussed two socialist responses to Mises's calculation argument ([von Mises 1920, 1922](#)) that both reject the need for monetary calculation. But while O'Neill ([O'Neill 1996; O'Neill 2003, 112-128; O'Neill 2006](#)) rejects it primarily for the choice of ends, the Cockshott/Kantorovich ([Cockshott 2010, Kantorovich 1960, 1965](#)) approach focuses on the choice of methods for achieving some end. They thus differ in what they consider to be the core of Mises's argument. As the chapter has argued, Mises's claim of the principle irrationality of socialism does not hold under either reading of the argument. Monetary valuation is not a necessary precondition for making a rational choice between ends. It is perfectly feasible to come to a decision by directly deliberating about the alternative options. In fact, such a comparison is at the heart of any decision making, independently of whether money serves as an intermediary or not. That socialism does not allow for economic planning to be instrumentally rational is also false. Given a planning target formulated as proportions of production of a number of articles, linear programming methods allow to determine the plan which maximally fulfils such a planning target.

A more serious problem lies in the combination of both value judgement and instrumental rationality, when choices between ends have to be made in light of a complex economy with countless different methods of achieving those ends. In order to utilise Kantorovich-style linear programming ([Kantorovich 1960, 1965](#)), we must first set the proportions at which items are supposed to be produced. This decision must be made in light of the opportunity cost of production. We can do this by measuring the opportunity costs of items in terms of plan fulfilment. Once we have such a measure of cost, the plan target can be adjusted by comparing market clearing prices to opportunity costs, a process that is described in more technical terms in the next chapter. Other measures of value, such as labour values in the TNS model ([Cockshott & Cottrell 1993](#)), could be used insofar as they constitute an adequate proxy for the opportunity cost of producing an item. The conditions under which this is or is not the case are experimentally investigated in the next chapter.

The chapter has shown that Mises's objection that there can be no rational economic decision making under socialism is not principally true. Furthermore, I have shown how a socialist

society might go about making rational economic decisions. This has important consequences for the kind of socialist economy that should be striven for. The next chapter will give a more holistic picture of this economy and describe a simple computational simulation of production planning for such an economy and some of its empirical results.

Chapter 7

Computational Results from a Simplified Model

This chapter will give a more holistic overview of a simplified version of the model of socialism I have worked towards in previous chapters. The focus of this model is determining an optimised short-term production plan that is responsive to consumer demand, as a replacement for the price mechanism in capitalist market economies. The point is to demonstrate that we can imagine a non-market economic system which allows economically rational production planning. This directly contradicts Mises's calculation argument ([von Mises 1920, 1922](#)), which was discussed in the previous chapter. The model also integrates some of my previous arguments on distributional principles for a socialist society.

The simplified model presented here has been implemented in a computer simulation. The simulation has three distinct purposes. The first purpose is demonstrative: it shows how such a model might function in real life. The second purpose is that the implementation of the model in a computer simulation allows to identify issues that require further attention before such a model can be put into practice in the real world. The third, and perhaps most important purpose, is to test how the model based on opportunity cost valuation behaves differently from the Towards A New Socialism (TNS) model of [Cockshott & Cottrell \(1993\)](#), which is based on labour valuation. In particular, I tested how production is adjusted in response to deliberate emission constraints. I found that under some circumstances (though not all), the opportunity cost model sees a stronger shift in production towards consumer products with a smaller carbon footprint. In the discussion section, I will argue that this represents a more appropriate response to emission constraints. The use of opportunity cost valuation can be seen as a non-market alternative to emission trading ([Bohm 2000](#)) or carbon taxes ([Ghandi & Cuervo 1998](#)).

The presented model derives from the philosophical considerations of previous chapters.

Clearing prices are used for distributing consumer products. This was argued for in Chapter 5. Clearing prices insure that prices reflect the decision-relevant opportunity cost of consumption. By doing this, they ensure that the distribution of consumer products is not only efficient, but preserves the distributional pattern of tokens, which is derived from the egalitarian assumptions outlined in Chapter 4. As I argued in Section 5.1, this method of distributing consumer products differs from real markets, as it is not based on the principle of exchange.

Linear programming is used to calculate an optimised production plan. The model thereby avoids the irrationality objection to socialist planning raised by [von Mises \(1920, 1922\)](#), which was discussed in the previous chapter. Linear programming allows for resources to be used in an instrumentally rational manner, by ensuring that as much as possible is produced at set proportions using the available means. The model thereby demonstrates directly that the absence of markets in a planned socialist economy does not automatically lead to the abolition of instrumental rationality in the deployment of productive resources.

Finally, the choice of proportions at which consumer products are to be produced is made responsive to consumer demand through a comparison of market clearing prices and opportunity cost valuation. The model thereby demonstrates that socialism can also deal with the joint problem of value and instrumental rationality. By taking into account both consumer choices and production opportunity cost, the derived production plan will be instrumentally rational under consideration of the value judgements of consumers.

I will begin this chapter by explaining my reasoning for making use of a computer simulation. In Section 7.2, I will then give an overview and discuss some of the simplifications of the model that is implemented in the simulation, before giving a more formal account of the simulation in Section 7.3. In Section 7.4, I present some results from the model, which are then discussed in Section 7.5. Finally, I discuss the relevance of the simulation in the philosophical context of this thesis in Section 7.6.

7.1 Why use a Computer Simulation?

The computer simulation fulfils three distinct purposes which are demonstration, problem-identifying and testing. The simulation demonstrates how a planned economy might work in more detail by providing a technical account of how plans are calculated and adjusted. In the description of the simulation that follows, we will see mathematical formulations of the linear programming problems that have to be solved in a socialist economy. While the test economies that were looked at are very small, the formulation would in principle remain analogous for an economy with a more realistic product diversity. The simulation demonstrates how rational planning of production is possible in the absence of markets, thus contradicting Mises's calculation argument ([von Mises 1920, 1922](#)).

Putting the ideas developed in the previous chapters into practice in a simulated economy can help identify possible issues. One thing that became clearer when creating the simulation is that one must specify the exact controller through which prices are adjusted so that they approach market clearing prices. A similar controller needs to be specified for the adjustment of the plan target. While relatively simple controllers worked in the simulation, finding better controllers will likely be a challenge if such a model were to be implemented in a real economy. I was also able to test the computational complexity of the simulation and discovered the need for some improvements in the algorithms used.

Finally, and possibly most importantly, the simulation can be used to test what would happen under specific circumstances. As I have argued in Section 6.6 and will further elaborate in Section 7.2.4, the absence of markets in a socialist economy requires alternatives to market-based instruments of environmental policy, such as emissions trading or a carbon tax (Ghandi & Cuervo 1998, Bohm 2000, Stavins 2001). I suggest that the introduction of an emission constraint, in combination with the use of opportunity cost valuation, will lead to an appropriate shift in production towards lower emission products. This directly relates to Mises's rationality objection to socialism (von Mises 1920, 1922), by addressing whether there can be a rational way to reduce emissions in the absence of markets.

The simulation is used to test how the model will really respond in the face of such an emissions constraint. This is then compared to the results of the alternative labour value (LV) model, a simplified realisation of the TNS model (Cockshott & Cottrell 1993), under the same circumstances. In both versions of the simulation, carbon emissions are deliberately constrained and an optimal plan under this constraint is calculated. However, in the LV model the plan target is then adjusted by comparing clearing prices to labour values, while in my model opportunity cost valuations are used instead of labour values.

The intuition motivating this comparison is that a rational response to an emission constraint is not just to reduce production overall or change production methods, but also to change the kind of products that are produced. Some low-emission products might even see increased production while high-emission products would be reduced quite drastically. Such an adaptation makes sense in light of emission constraints, because high emission products use up a lot of the limited emissions and should thus only be produced when there is significant benefit to them. Productive capacity can then be used to produce alternative products which use up less of these emissions. More of these products can be produced overall without violating the emission constraint.

Consumption would thereby change in a qualitative way. Consumers would not just consume less, they would consume different kinds of products. But overall the negative impact of emission constraints on the standard of living can be reduced by shifting towards alternative products. If consumer products were produced at the same proportions, the overall reduction

in production might have to be quite significant to meet emission targets. Alternative low-emission products would help reduce the stress that this would put on consumers.

With the help of the simulation, we can see whether my model behaves in accordance with this intuition. We can also compare this with the labour value model. A further intuition that motivates this comparison is that labour values do not directly consider the emissions of production in valuation and the LV model might thus not show an appropriate shift in production. Should both, however, behave in a similar way, labour values would be a computationally simpler valuation than opportunity cost and could be used as a proxy. If the labour value model does not yield the same results, the opportunity cost model might be considered the more attractive alternative.

While we can try to use intuition to try to understand what would happen under various circumstances, the complexity of such problems makes this difficult and unreliable. It thus makes sense to use either a mathematical model or a computational model to aid us. A mathematical model would rely on a description of the system in terms of equations. We could then enter various parameters into these equations to solve for variables of interest. Such an approach is generally preferable to a computational model, as it can be computationally simpler, and the equations would cover all possible circumstances instead of only the cases for which the simulation is run. Unfortunately, a mathematical model cannot be used in this case, as linear programming is an algorithmic method distinct from standard mathematical analysis. The optimisation problems treated by linear programming cannot necessarily be solved using standard mathematical analysis, which is one of the reasons that Leonid Kantorovich (1960, 1965) came up with linear programming in the first place. For this reason alone, it is necessary to use a computational model based on a linear programming solver, rather than a mathematical model.

A mathematical model would also require specifying a plausible multi-dimensional demand function for consumer products. Demand for each product would have to depend not only the price of that product, but on the prices of other products as well. The overall demand specified by this multi-dimensional function would also have to be in line with the budgets of consumers. For the simulation I have used a simple agent-based consumer model instead, which has sufficiently realistic behaviour for the purposes of the simulation, but would not be compatible with a mathematical model due to its computational complexity.

To summarise, using a computer simulation is the best way of testing the theoretical consequences of the model of socialism developed here. Using the power of a computer helps us deal with complexity of economic planning problems. The simulation also demonstrates how such a model would work in more technical detail and helps to identify any issues that might arise during implementation in real life.

7.2 Simplified Model

A simplified model of a socialist economy was used for the purpose of the simulation. This section will outline the overall model and discuss the simplifications made and how these differ from a potential more complete model. While the issue of distribution has already been discussed at length in previous chapters, other issues relating to economic expansion and long-term strategic planning will be highlighted for the first time. These are thus identified as areas requiring further research which is beyond the scope of this philosophically grounded analysis.

7.2.1 Overall Model

The model assumes a plan target that specifies the relative proportions at which various consumer products are to be produced. An initial plan target needs to be specified, this can be done based on best estimates of the needs of consumers or based on previous production before the model is implemented. This plan target will be used for the first plan period, while successive plan periods adapt the plan target of the previous period in response to consumer behaviour.

Based on the current plan target an optimised production plan for one plan period is calculated using a linear programming solver. In the simulation a plan period is assumed to be 30 days, but the length of the plan period can be adapted to circumstances. A plan is understood to be a specification of the intensity at which various production methods ought to be used. So, the plan specifies what production methods are to be used and to what degree. From this it also follows how many resources and workers have to be deployed to the various production methods and what amount of various kinds of items that will be produced.

An optimisation always implies the maximisation of some function, called the objective function. The objective function is given by the output of any one consumer product. Since the proportions of the plan target are maintained, this means that the optimised production plan produces as many of all consumer products as possible at these proportions, no matter which of the products was chosen as the objective function.

The optimisation is subject to constraints which ensure that the plan is technically feasible with available resources. The constraints also ensure that consumer products are produced at the proportions specified in the plan target and that an equivalent amount of materials and intermediate products used up in the production process is produced in the same plan period. The optimised production plan is thus the plan with the highest value of the objective function (output of the chosen consumer product) which does not violate any of the constraints.

After calculating the optimised production plan for a plan period, the plan can be put into action which will produce a variety of consumer items. These items can now be made available to consumers. Each consumer has a limited number of tokens which can be redeemed for consumer products. Initial token prices for these items should be best possible estimates of market clearing prices. As with the initial plan target it is also possible to use previous prices as indicators. The prices are then changed in response to consumer demand. Should demand for a consumer item at a given price exceed the amount produced, the price will be increased. Should demand fall short of supply, prices will be lowered. In the simulation prices are changed on a daily basis, but as with the length of the plan period this is flexible and can be adapted to circumstances. In general, prices should be regulated in such a way as to approach market clearing as soon as possible, but a key assumption of the model is that towards the end of the planning period prices will be at or close to market clearing prices.

In addition to an optimised production plan, each plan period opportunity cost valuations will have to be calculated for each product. Depending on circumstances these valuations might not see much change each plan period, in which case a less frequent calculation is possible. The details of how such valuations can be calculated are discussed in Section 7.3.2.3.

Towards the end of the plan period market clearing prices can then be compared to valuations for each consumer product and the plan target can be adjusted in response. Should prices exceed valuations for a product, the relative proportion of that product should be increased. Is the opposite the case, the relative proportion is decreased. Adjusting the proportions in the plan target for each consumer product yields the new plan target for the next plan period. From this the cycle starts again and a new optimised production plan is calculated, consumer products are made available to consumers at previous market clearing prices, the prices are changed in response to demand and so on.

7.2.2 Distribution

Let us now take a look at various simplifications that are made in the simulation. In Chapter 4, I have argued that the distribution of tokens which can be redeemed for consumer products should in general depend on labour contribution. I argued that this is the most desirable distribution under ignorance in the framework of probabilistic egalitarianism. Adjustments to this distribution might be made when the condition of strict ignorance is not met. Some items might also not be included in this token scheme and be distributed through some other mechanism, such as on the basis of an assessment of individual needs.

The agent-based model used to simulate consumers ignores all of this and assumes that each consumer gets an equal number of tokens, which is not tied to the amount of labour they contribute. In fact, individual labour contribution is not considered. Instead the model only

considers the overall amount of labour available to the economy, which is assumed to be constant. This does not consider the possibility that people might wish to forgo consumption in favour of shorter working hours.

Chapter 5 also considered that the token prices of consumer products should correspond to the market clearing prices at which supply and demand match. The simplified model does take this into account. Token prices are thus continuously adjusted so that they approach market clearing prices.

7.2.3 Economic Expansion

The simplified model assumes simple reproduction of the economy in the sense of Marx (2008, 591-604). This means that depreciated capital stock, such as machinery, has to be replaced, but capital stock is not expanded nor reduced. Moreover, no changes to the composition of the capital stock are allowed. So, if there are 100 blast furnaces in the first planning period, then there will be 100 blast furnaces in the next and so on. Blast furnaces will be replaced at the rate that they are depreciated by use, but no additional blast furnaces will be built, and the stock of blast furnaces is not allowed to deplete over time.

The economy in the simplified model is still allowed to change how the existing capital stock is used and what kind of consumer products are produced. For example, in one plan period only half of the blast furnaces might actually be used, while in another they are used at full capacity. One plan period might use the existing means of production to produce more heat for homes, while another might see more production of processed food instead. In the test examples discussed in the results section, capital stock is simply ignored and labour and emission rights are the only constraining factors considered.

The simplified model also assumes that there is no technological change over the time period considered. This means that the available methods of production are the same and no new production methods are introduced in one plan period which were not already available in the previous plan period. There are also no changes to resource constraints, including constraints on the available labour power. Since expansion of capital stock, growth of the working population and technological progress are the main drivers of economic growth, one might say that the simplified model allows for no economic growth¹. Instead there are only changes in the composition of production and products within unchanging limits.

A more complete model would allow for changes in capital stock, since expansion or con-

¹It is not immediately clear how one might measure economic growth in this model. A measure similar to Real GDP, which aggregates token prices of consumer products based on the price level of a fixed day might share the same advantages and disadvantages. This has, however, not been monitored in the simulation, since only simple reproduction is considered.

traction of the stock of various production goods can be important for adjusting the economy to changing needs and circumstances. Building up the overall stock of machinery can also be crucial in order to increase production or labour productivity, which can both contribute to a higher standard of living for the population. This is especially important in underdeveloped economies. [Feldman \(1964\)](#) thus argued that a developing socialist economy should defer part of the potential production of consumer goods and instead dedicate resources to the expansion of capital stock in order to achieve higher consumption levels later on. This can potentially yield a net benefit to consumers over a longer period.

There are a variety of ways that the model could potentially be expanded to include this and there is a lot of potential for further research on a formal model. One way is to set targets by how much various kinds of capital stock must be expanded in each plan period. These targets would be determined as part of a long-term industrial strategy and would be factored into a linear programming problem as additional constraints. This means the production of consumer products would be maximised under the constraint that a given amount of capital goods must be produced at the same time.

Another way, that is explored by [Cockshott \(2019\)](#), is to calculate multi-year plans which optimise production over several planning periods. Because dedication of some resources to the capital goods sector in the first period will increase potential production of consumer goods in later periods, the optimal plan will often see substantial investment in capital stock early on, which is in line with [Feldman \(1964\)](#). It is necessary to ensure that this early investment does not lead to an inadequate satisfaction of consumption needs in the first years. Cockshott thus suggests an objective function that rewards overfulfilment of plan targets² less than it rewards underfulfilment ([Cockshott 2019](#), 9). An optimal plan will thus not allow for excessive reductions in the provision of consumer products.

7.2.4 Green Energy Transition

One part of the economy that currently requires a substantial shift in the composition of capital stock is the energy sector. This is because fossil fuel energy is a major contributor to greenhouse gas (GHG) emissions ([IPCC 2014](#)). In order to reduce GHG emissions, it thus makes sense to reduce the number of coal and gas power plants, while increasing the capacity for emission free energy, such as nuclear, hydroelectric, wind or solar. Wind and solar energy also require expanded energy storage capacity for time periods of low production ([Wald 2010](#)). A major limitation of the simplified model is that it does not allow for such changes in the composition of capital stock to take place, as only short term planning is considered. I will now explain how the simplified model can nonetheless contribute to a

²In Cockshott's model plan targets should be seen as absolute values whose production should be met. This is opposed to the model presented here, where plan targets merely specify proportions. Absolute values of output might be of a completely different magnitude to plan targets.

reduction of GHG emissions.

There is a significant way in which environmental policy can be implemented and thus studied within the simplified model, despite not allowing for long term change in the composition of capital stock. The model allows for the introduction of deliberate emission constraints which limit the extent to which available fossil fuel capacity will be used. The idea behind this is that of a carbon budget (Meinshausen et al. 2009). In order to limit average global temperature increases to a certain amount, there is a finite amount of GHG that can be emitted into the atmosphere. There is significant epistemic uncertainty involved in calculating such a budget, but Meinshausen et al. (2009) estimated that in 2009 a remaining carbon budget of 1440 Gt CO₂ would result in 50% chance of less than 2°C warming. Similar budgets can be calculated for a variety of combinations of temperature targets and probabilities.

Assuming that such a budget has been agreed upon, it could then be divided among the world economies and each country might further disaggregate its budget into annual targets. The recent Paris Agreement on Climate Change (UNFCCC 2015) takes a different approach and instead only sets an overall temperature target of ‘well below 2°C’ (UNFCCC 2015, 3) and allows countries to set their own individual targets on emission reduction. Either way, a socialist planned economy might realise such annual emission targets by calculating an optimised production plan under a corresponding emission constraint.

The function of such a constraint would be similar to an emission trading scheme for a market economy. The cited advantage of such schemes is that they use the supposed or real efficiency of the market to minimise the cost of pollution reduction, while having a perfectly predictable and controllable remaining pollution (Stavins 2001). The regulator sets the number of permits that will be issued and thus controls the level of pollution that can continue. The market will then allocate these permits to the highest bidder and thereby ensures a degree of efficiency in the use of limited emission rights. Since a marketless socialist economy can not rely on market mechanisms to lead to an efficient allocation of emission rights, an alternative mechanism is needed. The simplified model does not use the market, but instead calculates an optimised production plan that abides by the emission cap. It thus ensures the efficient use of limited emission rights, but through optimal planning instead of through a market. A thus determined production plan might see a reduction in output as a result of an emission constraint (see Section 7.4), but that reduction is minimised due to the optimisation of the plan.

In order to transition towards a low emission economy, a fundamental change in the composition of capital stock is necessary. But an emission cap can play an important role in addition to that by ensuring that available capital stock is not used in a way that exceeds emission targets. An optimised production plan under an emission cap will put a stronger emphasis on economising on fossil fuel usage, rather than on other factors. As long as there are insufficient low emission energy sources, energy-intensive production methods might be limited

in favour of alternative methods, even when these have other drawbacks. For example, the transportation industry might be instructed to economise on fuel, rather than on other inputs such as labour. A route that uses less fossil fuel but requires longer driving hours might thus be preferred.

7.3 The Simulation

Having given an overview of the simplified model and some of the simplifications involved, I will now give a more technical and detailed account of the simulation. First, I will consider the various inputs into the simulation that define various variables. Next, I will consider the process of optimisation and how this is used to determine valuations of consumer products. Finally, I will outline the agent-based consumer model and how consumer behaviour is used to adjust the plan target.

7.3.1 Inputs

Inputs into the program are specified by tables in the .csv format which describe available and necessary resources and various other variables that need to be defined. Production possibilities are specified by tables resembling Leontief-style Input-Output matrices (Leontief 1986). Each column represents a possible method of production. In the first table (see Table 7.1) the rows represent an item that might be used as a production input. The table thus specifies how much of each item is needed to perform the production method at an intensity of one. The second table (see Table 7.2) in an analogous fashion specifies how much of each item is produced with the various methods. It is assumed that most productive resources are produced in the same plan period as they are used. It is, however, possible to specify further input requirements, which might represent resources like land, labor or capital stock, which cannot simply be produced in the same planning period. These are listed at the end of the input table. This also includes deliberate environmental constraints such as a cap on greenhouse gas emissions. Emission rights are simply assumed to be a further input requirement.

Inputs	Farming	Coal mining	Iron mining	Baking
Corn	2	0	0	5
Coal	1.05	1.1	3	1
Iron	1.09	2	1.2	0
Bread	0	0	0	0
Labour	2	3	1.3	2.1

Table 7.1: Input table based on a small sample economy provided to me in personal correspondence with William Paul Cockshott

It is possible that there are several different methods that produce the same items using different inputs. For example, one method might use more energy and machines, while another

Outputs	Farming	Coal mining	Iron mining	Baking
Corn	11	0	0	0
Coal	0	13	0	0
Iron	0	0	17	0
Bread	0	0	0	23

Table 7.2: Output table complementing Table 7.1

	Corn	Coal	Iron	Bread
Target	6	7	0	10

Table 7.3: Target vector complementing Tables 7.1 and 7.2

method is more reliant on labour. It is also possible for a method to produce several different products, as is the case in industries that have some by-product, though this has not been studied for this thesis.

A plan target vector (see Table 7.3) specifies at which proportions products are to be produced for consumers. This does not consider the part of the product that gets used up in production, but only the share that is actually intended for consumers. Thus the target value for iron in Table 7.3 is 0, as iron is only used in manufacturing. For every 6 units of corn, 7 units of coal and 10 units of bread are to be made available to consumers. For the simulation an initial plan target needs to be specified, which will then be adapted depending on consumer choices.

Further variables that must be specified are a resource vector, which states the available amount of non-produced resources like labor or emission rights, an initial price vector and product weights, which are used in the consumer model. In each plan period an optimal plan is calculated based on the current plan target. A plan is a specification of the intensities at which various production method are to be used. Next, values are calculated and the produced consumption goods are marketed to consumers using the clearing prices from the previous plan period. In the first period the initial target and initial prices are used. The prices are then successively adjusted in order to approximate market clearing prices. Finally, clearing prices are compared to values and the target is adjusted for the next plan period based on this comparison.

7.3.2 Linear Optimisation and Valuation

In order to calculate an optimal plan, the `lp_solve` package for python is used (["lp_solve" n.d.](#)). `lp_solve` is an open source linear programming solver which uses the simplex method, the Western variant of linear programming developed by [Dantzig \(1954\)](#). The objective is to maximise production of consumer products at the proportions specified by the plan target. We can do this by maximising production of any one consumer product (the objective product) while ensuring proportionality through constraints. The simulation always uses the product

represented in the first row of the input and output tables (Product 1). This must thus be a consumer product (which have positive target values) and not a product that is exclusively used in production (which have target values of 0).

7.3.2.1 Objective Function

The linear objective function consists of n variables, each representing the intensity at which one of the n production methods is used. The linear factor of each variable is given by the amount of the objective product produced by the according production method, subtracted by the amount used by that method. The objective function f is thus given by

$$f(M) = \sum_{i=1}^n (O_{i,1} - I_{i,1})M_i, \quad (7.1)$$

where n is the number of production methods, $O_{i,j}$ is the output of the j th product of the i th production method, $I_{i,j}$ is the input of the j th product of the i th production method and M_i is the intensity at which the i th production method is used. What is considered as contributing to plan fulfilment is thus only the surplus product that is available for consumers, not the part of the overall product that is used in production.

7.3.2.2 Constraints

The optimisation task for `lp_solve` is to find the values of the variables which maximise the value of this objective function. This must, however, be done without violating any of the constraints. There is one constraint for every type of item in the economy, except for the objective product. These can be divided into three distinct categories:

- a) a target constraint for every consumer product
- b) a production constraint for every product that is only used in production
- c) a resource constraint for every non-produced input requirement

Target constraints ensure that consumer products are produced in the proportions specified in the plan target by relating the amounts of the objective product produced to those of the other consumer products. The target constraint for the j th product with target value t_j can be represented by the linear equality

$$\sum_{i=1}^n \left[\frac{1}{t_1} (O_{i,1} - I_{i,1}) - \frac{1}{t_j} (O_{i,j} - I_{i,j}) \right] M_i = 0. \quad (7.2)$$

The input requirements of each production method is subtracted from the output so that only the portion of products intended for final consumption is considered.

Production constraints ensure that no more of a product is needed as input than is produced. There is no need to add production constraints for products which are used in both production and final consumption, as this condition is already satisfied due to the corresponding target constraint as long as the objective function is positive. For all other products, the production constraint can be expressed as the inequality

$$\sum_{i=1}^n (O_{i,j} - I_{i,j}) M_i \geq 0, \quad (7.3)$$

where j is the number of the product to which the constraint corresponds.³

The resource constraints limit how much of any non-produced input, or inputs which are produced independently of the plan, can be used. This might include labour, land, limited machinery or resources and even emission rights, which can be treated as an input requirement for the purpose of the simulation. The resource constraint for the item in the j_{th} row of the input table takes the form of the inequality

$$\sum_{i=1}^n I_{i,j} M_i \leq R_j, \quad (7.4)$$

where R_j is the entry in the resource vector corresponding to the j_{th} item. R_j thus represents the limit to how much of the item can be used during one plan period.

7.3.2.3 Valuation

The simulation uses a novel system of opportunity cost valuations (OCVs, see Section 6.6) which are also calculated using `lp_solve`. The underlying idea is to consider the opportunity cost in terms of plan fulfilment of a single unit of a product. The OCV of an item is the answer to the question ‘How many more consumer products (at the proportions specified in the plan target) could be produced if we did not have to expend the resources for one unit of the item?’. It is measured as an increase in the optimised objective function.

To calculate the OCV of a product the optimisation discussed in the previous section is repeated, only this time an additional production method with one unit of the item as output

³The simulation always uses the strict inequality operator instead due to a limitation in one of the scripts used. This makes little difference.

is considered. The method does not require any inputs, allowing the product to be produced freely. But since only one unit of the product should be produced freely, the intensity of that method is limited to one using an additional constraint. The increase in the objective function observed after optimisation is recorded as the OCV for that product.

This process has to be repeated for every consumer product. It is not necessary to calculate OCVs for non-consumer products as they will not be needed in plan target adjustment. However, a major drawback of this method of valuation remains that it requires a number of optimisations equal to the amount of consumer products in the economy. This increases computational complexity by a factor of m , where m is the number of consumer products. The good news is, however, that the calculation of the OCVs of various products can easily be parallelised, since the calculations are independent of each other.

For comparison purposes an alternative version of the simulation that uses labour values instead of OCVs was also created. This corresponds to the original TNS model (Cockshott & Cottrell 1993). Each production step retains the value of inputs and adds value equal to the labour time used. Should more than one production method be used, the average resources and labour used are assumed to contribute to value. This yields a set of linear equations with one equation for every product type. Linear dependencies can only occur if a production method has more than one product. As long as such cases are not considered, the linear equations can thus be solved to determine labour values. Labour values may change depending on which production methods are used since this may effect average labour usage.

7.3.3 Consumer Model and Target Adjustment

Once the optimal plan and OCVs are calculated consumer products are marketed to consumers at initial prices. This is repeated several times with prices each time being adjusted based on a comparison of supply and demand to approximate the market clearing prices at which demand and supply match. In a real economy the demand would be known from the observed purchasing behaviour of consumers. For the purpose of the simulation an agent-based consumer model was developed which yields an overall demand that is responsive to prices. Once market clearing prices have been approximated the plan target is adjusted for the next plan period, based on a comparison of prices and OCVs.

7.3.3.1 Consumer Model

The consumer model determines demand based on prices and the weights assigned to consumer products. There are 1000 consumers in total and they each have 100 credits to spend. Demand is calculated for each consumer individually and then aggregated. Both weights and prices influence how likely an individual consumer is to buy a product. At the same price a

product with a higher weight will be bought more often. With the same weights, a product with a smaller price will be bought more often. This is achieved by a two step process. First, a product is chosen using a random process in which the likelihood of any product being chosen scales with the weight. A product with weight 2 is twice as likely to be chosen as a product with weight 1 and so on.

Next, it is checked whether the consumer has enough tokens left to buy the product. If she does, the demand for that product is increased by one and the token subtracted from the consumers budget. This process is repeated until the consumer cannot afford the chosen item 5 times in a row. We can interpret the process with the help of a shopping list. Each shopper has an individual, ordered and infinite shopping list. Items can appear several times in the shopping list. For example, the item on the top of the shopping list might appear again further below. Items with a higher weight appear more often on the list. The ordering of the list represents how important the item is to the shopper. She will first attempt to buy the first item on the list, then the second and so on. Only when she cannot afford an item does she skip it. She will stop shopping only when she cannot afford 5 items in a row, because at this point she concludes that she cannot afford anything else. She never reaches the end of the shopping list, as it is infinite. Only running out of tokens will cause her to stop shopping.

There are several unrealistic assumptions in this model. In reality it might happen that a product is not bought because it is deemed too expensive, even though it could technically be afforded. The model is, however, sufficient in that it generates overall demand that is responsive to prices, which is what matters for the purpose of the simulation. Responsiveness to prices is limited, but nonetheless significant as long as consumers can only afford a small amount of products.

7.3.3.2 Clearing Prices

In order to approximate clearing prices at which supply and demand match, the price for each consumption good is adjusted in proportion to the difference between the supply of that product, determined by the linear optimisation, and demand for it, as determined by the consumer model. The examples discussed in this paper used a proportionality factor of 0.3. So a 10% difference between supply and demand would lead to a 3% adjustment of prices and so on. The consumer model is then run again with the new prices and the process is repeated a total of 30 times, after which there appears to be no further convergence of supply and demand. This process is modelled on a simple proportional controller. It is possible that with a more complex controller or machine learning better convergence could be achieved.

We can interpret the process by imagining that each run of the consumer model represents one day. This is repeated for a total of 30 days, during which prices are successively adjusted. After the 30 day period a new production plan, using a new planning target is calculated. A

problem with this interpretation is that every day demand may not be backed by supply or items might be left over for the next day, which is not currently taken into account. This is unrealistic, but makes it easier to approximate clearing prices.

7.3.3.3 Target Adjustment

For the next planning period, the previous target is adjusted based on a comparison of the opportunity cost valuations and the approximated clearing prices. The OCVs are scaled, such that the OCVs of the entire product are equal to its total price. Should the thus adjusted OCV for a product be above its price, the entry in the target vector for the item is decreased. Should the OCV be less than the price, the target entry is increased. Once this has been done with every consumer product the new plan target has been found and the optimal plan and OCVs for the next plan period can be calculated.

Unlike in the proportional controller used for approximating clearing prices, the amount by which target entries are adjusted is independent of the difference between OCVs and prices. Instead they are changed by a fixed one percent of the current target.

7.4 Results

Though the simulation can handle much more diverse economies, it is easier to depict and understand results for a sample economy that only contains two consumer products A and B. To study the effect of emission constraints we will assume that product A requires more energy to produce than B. Energy production in turn uses up emission rights. The overall labour value of A and B is nonetheless the same since A requires more direct labour (see Table 7.4). To make comparison as easy as possible, we will assume that the initial target, initial prices and weights for products A and B are the same (see Table 7.5).

Inputs	Method A1	Method B1	Coal Power
A	0	0	0
B	0	0	0
Energy	2	1	0
Emission	0	0	1
Labour	1	2	1

Table 7.4: Input table for first test economy. Outputs for each method are assumed to be one unit of A, B and energy respectively

	A	B	Energy
Initial Target	10	10	0
Initial Prices	20	20	N/A
Weights	1	1	N/A

Table 7.5: Initial target, initial prices and weights for all test economies

Each plan period an optimal plan is calculated and the plan target for the next period adjusted. We can depict the output of consumer products corresponding to any plan as a vector/arrow in two dimensional space. The X-Axis depicts the amount of product A and the Y-Axis the amount of product B produced. The direction of the vector corresponds to that of the plan target.

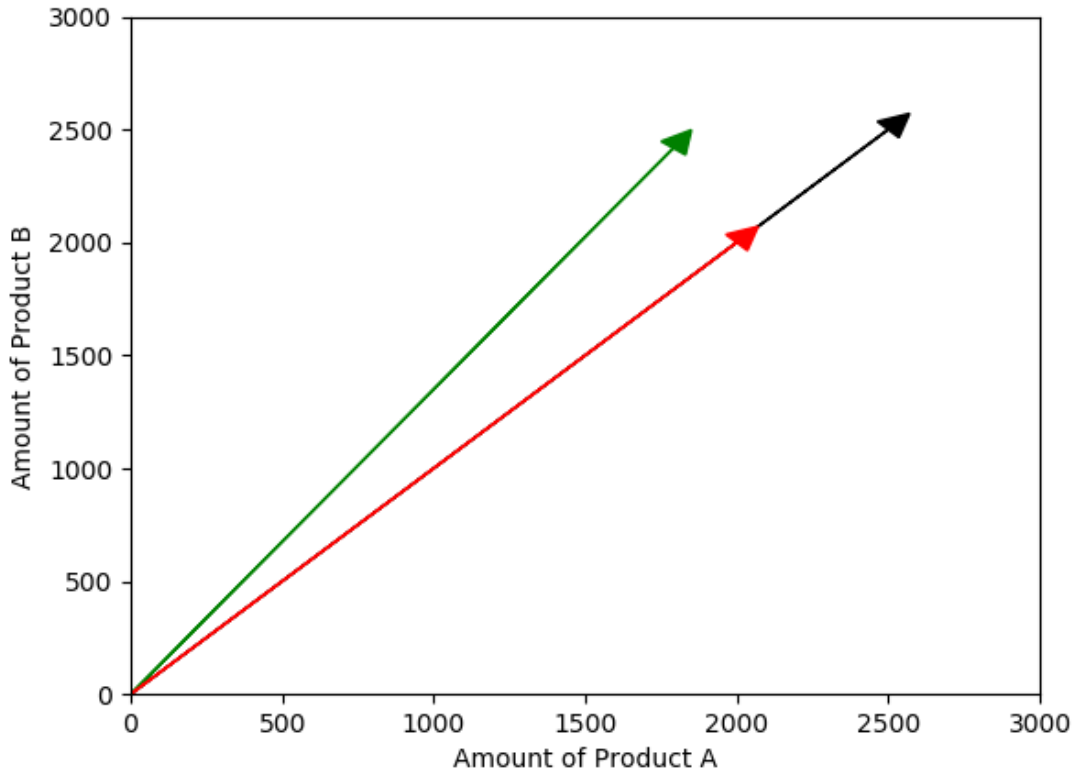


Figure 7.1: Amount of products A and B produced in the 20th plan period of the first test economy. Black represents the product without an emission constraint. It is the same for the OCV and labour value models. With emission constraint the products are represented by red (labour value model) and green (OCV model).

Figure 7.1 shows how production of consumer goods is adjusted in the labour value and OCV models when an emission constraint is introduced. The black arrow represents the product when the only resource constraint is labour, which is limited to 15000 units. When an emission constraint of 6000 is introduced in the labour value model the product is reduced, but the proportions are not changed. This is because the labour value of both products remain the same and the target is thus not changed. Adjusted labour values are slightly increased with the emission constraint, but relative to each other they are unaltered (see Table 7.6, first sample economy). In the OCV model the value of product A is increased relative to B due to the higher emissions (see Table 7.6). This leads to the plan target gradually being adjusted and the proportions at which A and B are produced are thus changed significantly in later plan periods. Instead of simply producing less of both products, the economy is adapted to produce more (in relative terms) of the more environmentally friendly product B, which is considered to have a lower cost in terms of OCVs. This is line with the hypothesis that the OCV model

gives stronger consideration to emissions in the choice of the plan target.

	Value(A)	Value(B)	Value(A)/Value(B)
First Sample Economy			
No emission constraint (LV)	19.1	19.1	1.00
No emission constraint (OCV)	19.2	19.2	1.00
With emission constraint (LV)	21.5	21.5	1.00
With emission constraint (OCV)	29.8	14.9	2.00
Second Sample Economy			
With emission constraint (LV)	21.3	18.8	1.14
With emission constraint (OCV)	22.0	17.6	1.25
Third Sample Economy			
With emission constraint (LV)	18.2	21.4	0.85
With emission constraint (OCV)	21.8	17.4	1.25

Table 7.6: Adjusted labour values and adjusted OCVs of A and B for the three test economies in the 20th plan period using the LV and OCV models respectively. Since adjusted values are scaled to prices, the unit is one unit of consumer credit. Values in the sample economies change very little over time so that the values in earlier plan periods are close to the values in the 20th plan period depicted here.

It can be observed that in this simple economy, the OCVs depend entirely on whether labour or emission constraints are the limiting factor for production (see Table 7.6). Without the emission constraint labour is the only limited resource hindering a further expansion of production. The OCVs of products A and B are thus proportional to their labour values. With the emission constraint, labour becomes irrelevant as it is no longer the limiting factor. OCVs are now proportional to energy content. This raises the question why one should calculate OCVs at all and not simply use labour valuation or valuation in terms of energy, depending on what the limiting factor is. However, as we shall see in the next examples, OCVs are not always identical to either labour values or energy values.

A separate consideration is that there may be more than one way to produce an item. Labour values can take land into account by virtue of the increasing amount of labour per product needed when less fertile land has to be cultivated. Perhaps a similar argument can be made in relation to emission constraints. When all emission rights are used up, labour has to be substituted for energy by using more labour intensive production methods. Table 7.7 considers a second test economy in which there are alternative ways of producing both A and B. While the alternative production methods are much more labour intensive, they require less energy and can thus be used when emissions are a consideration.

Figure 7.2 shows how production is adapted in the second test economy. Without an emission constraint the optimal plan is identical to that for the first test economy, as the more labour intensive production methods are not used. With an emission constraint Method A2 sees considerable use in both the labour value- and OCV models. In the labour value model, the use of A2 leads to an increase in the average labour content of product A and thus in its value (see Table 7.6). The resulting shift in the plan target is in this case identical to the shift

Inputs	Method A1	Method A2	Method B1	Method B2	Coal Power
A	0	0	0	0	0
B	0	0	0	0	0
Energy	2	1	1	0	0
Emission	0	0	0	0	1
Labour	1	3	2	4	1

Table 7.7: Input table for second test economy. Outputs for each method are assumed to be one unit of A for methods A1 and A2, one unit of B for methods B1 and B2 and one unit of energy for coal power. The third test economy is identical, except that method A2 is left out.

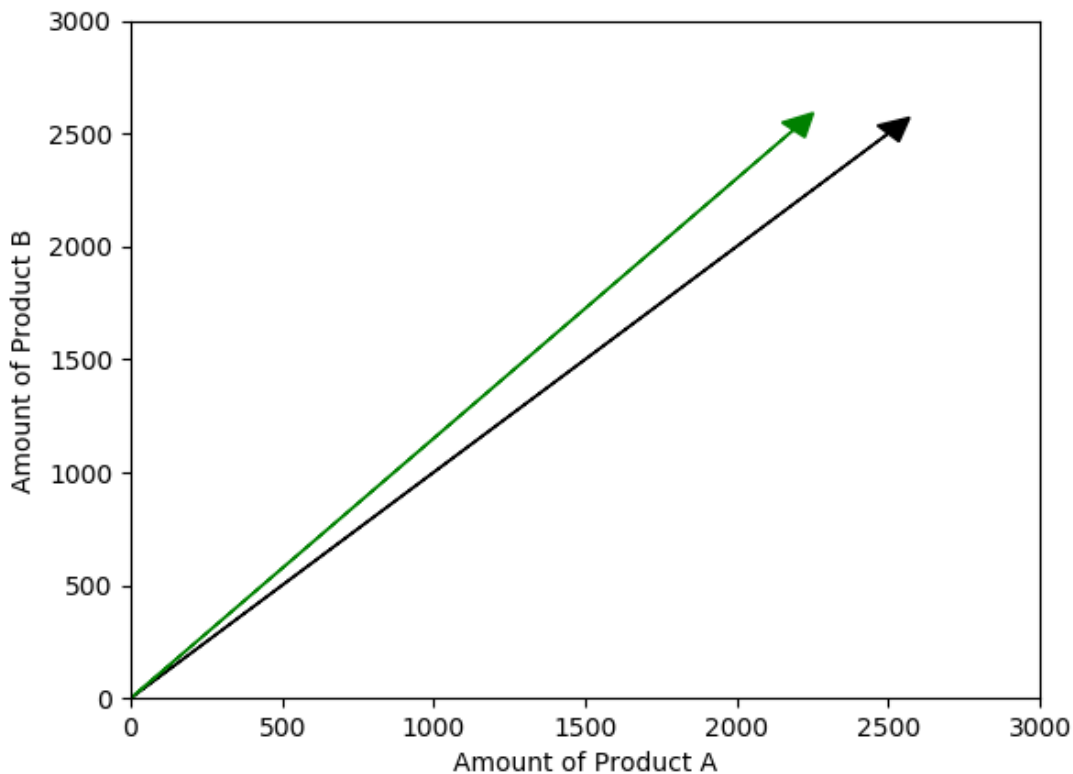


Figure 7.2: Amount of products A and B produced in the 20th plan period of the second test economy. As before, black represents the product without an emission constraint. With emission constraint the products are represented by green (OCV model). The results of the LV model correspond almost exactly to those of the OCV model and are thus not shown separately.

observed in the OCV model (see Figure 7.2). This demonstrates that under certain circumstances, an emission constraint can have a considerable effect on labour values and thus the plan target in the labour value model. However, as the next example shows, the result can differ significantly from the OCV model.

In the third test economy it is assumed that only for the production of B there is an alternative, more labour intensive method B2. Method A2 is thus not considered and A has to be produced through the more energy intensive method A1 (as in Table 7.7, just without Method A2). This

leads to significant use of method B2 to save energy in both models. In the labour value model this actually results in an increase in the value of B, since the average labour time used to produce B is now higher (see Table 7.6). We thus observe a shift in the plan target in the opposite direction, while in the OCV model we still see a shift in favour of B (see Figure 7.3).

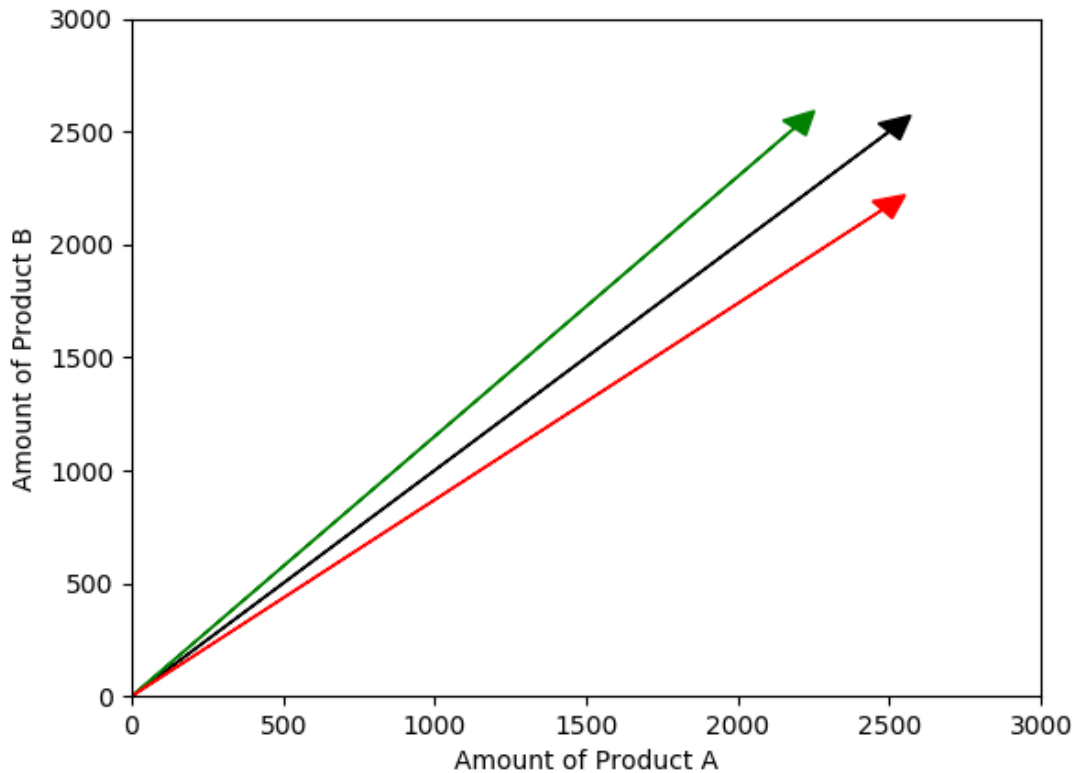


Figure 7.3: Amount of products A and B produced in the 20th plan period of the third test economy. As before, black represents the product without an emission constraint. With emission constraint the products are represented by red (labour value model) and green (OCV model).

The availability of an alternative method B2 does not increase the opportunity cost for product B, though it does increase the labour value. This has the effect that in the labour value model the plan target is shifted in favour of A, which is the more environmentally destructive product. The OCV model instead puts a stronger emphasis on the production of the eco-friendly product B. In both models the overall emissions are constrained by the same limit. So it is not the case that one model leads to higher overall emissions than the other. But they use a different measure of cost to determine what consumer products ought to be produced. In confirmation of the intuition expressed in Section 7.1, the labour value model does not necessarily lead to a shift of the plan target towards more environmentally friendly products. Whether the outcome of the labour value model or the OCV model should be deemed more appropriate will be discussed in the next section. However, the simulation clearly demonstrates that these two measures of cost and the resulting plan target can differ significantly and labour value can thus not be used as a proxy for opportunity cost as measured by OCVs.

7.5 Discussion

At the beginning of this chapter, I identified three reasons for carrying out a computer simulation: demonstration; problem-identifying; and testing. I will now discuss what we have learned on these three points in turn and then discuss the relevance of the simulation to the overall philosophical argument presented in this thesis.

7.5.1 Demonstration

Besides the explicit testing of the behaviour of simulated economies under specific conditions, the simulation is meant to demonstrate how a socialist economy might be rationally planned. The simulation demonstrates that, and also how the problem of economic rationality can be solved for a socialist economy. In the previous chapter, I argued that there is a dual problem of economic rationality that needs to be solved in a socialist economy. On the one hand, productive resources need to be deployed in a way that most effectively meets some ends that might have been decided upon. On the other hand, these ends themselves must be chosen in a rational manner. While both of these problems may be straight forward individually, it is the combination of them that is difficult to solve: How to choose the right ends under consideration of production requirements and limitations.

The simulation solves this by making use of both linear optimisation and opportunity cost valuation. The linear optimisation ensures that available means are used in an instrumentally rational way to provide as many consumer products at given proportions as possible. These proportions, i.e. the plan target, are then adapted based on both consumer choices and opportunity cost valuation. Since opportunity cost valuations are based on a consideration of production possibilities, this means that the proportions are sensitive to the lesser or greater difficulty and usage of limited resources involved in producing various items. Should the production of a particular item require much more labour, emissions or some other limited factor its production will automatically be reduced, unless consumers are willing to pay a significant amount of their limited credits on this item. This can be taken as an indicator that there is some great use to the item, which would justify its ongoing production despite the costs involved. The choice of the plan target thus takes into account both how important consumers judge various items to be, as well as the alternative possibilities being forgone by their production.

The presented simulation relies on several simplifications. The most important one is that it only models economies undergoing simple reproduction. There is no expansion or change of existing capital stock. While the economy is not completely static, its capital stock is. This is no doubt a significant limitation, but the simplified model nonetheless shows how the dual problem of economic rationality in a socialist society can in principle be solved, at least

within the limitations of the simplified model.

A defender of Mises's calculation argument might contend that socialist planners would still not be able to deal with more dynamic economies in which capital stock must be adapted based on changing requirements and technological standards. The basis of such an objection would presumably be that a dynamic economy is in some sense more complex and thus more difficult to plan in a rational manner. The fact that rational planning is possible in the simplified model thus does not demonstrate that it is also possible under a wider range of assumptions.

We should give some credence to such an objection, and it would perhaps best be addressed by building on the existing model to allow for changes in capital stock. But even without such potential future research completed, the existing simulation changes the terms of the debate significantly. If the combination of both instrumental rationality and rationality about ends is possible within the simplified economy, what reason is there to think this cannot be the case in an economy with dynamic capital stock? It should not be controversial that rationally planning a large industrial economy is no easy feat and certainly dynamic capital stock increases the complexity of the problem further. Both socialists and critics of socialism should be able to agree on this.

The question is whether the difficulty of planning a complex economy can in principle be overcome with the kind of methods considered here. For the calculation argument to be a convincing reason to reject socialism, it would have to provide some reason to believe that this difficulty cannot be overcome, either in principle or due to practical considerations. The interpretation of Mises's calculation argument discussed in the previous chapter suggested that the principle problem in rationally planning a socialist economy lies in the simultaneous combination of instrumental and value rationality. Since the presented simulation shows that this combination is not impossible within a socialist framework, the burden is on proponents of the calculation argument to explicate why socialism must nonetheless fail on grounds of economic rationality.

7.5.2 Problem identification

While developing and testing the simulation, two potential issues that require further attention became apparent. These relate to the convergence of the controllers and the run time of the optimisations. The simulation includes two controllers which regulate the credit price towards market clearing and the market clearing price towards opportunity cost valuation. It is necessary to ensure that these converge as fast as possible. Appropriate controllers must be identified which can ensure adequate convergence. I will suggest possible ways to improve upon the control mechanism used in the simulation.

In order to calculate opportunity cost valuations, a linear optimisation has to be carried out for each product that is to be valued. This potentially increases run time of the algorithm by a factor equal to the number of consumer products. However, even a single optimisation can take significant time for a complex economy, containing a wide variety of products, production methods and constraints. I will present empirical data on the run time of `lp_solve` for economies of various levels of complexity, which suggests that for the considered economies computational complexity is in principle tractable, though further improvements are desirable. I will suggest ways of reducing the complexity. In Section 7.6, I will also discuss the relevance or lack of relevance of computational complexity to the socialist calculation debate.

7.5.2.1 Controllers

In the simulation, credit prices of consumer items are adapted on a daily basis, a total of 30 times before a new plan is calculated. Each day consumer demand at current prices is compared to the supply of the respective items according to the current production plan. Should demand exceed supply, prices must be increased. Should supply fall short of demand, prices must be lowered. This way actual prices are regulated towards the ideal market clearing prices at which demand matches supply. Quick convergence towards market clearing is necessary for two reasons. First of all, it ensures the best possible distribution of consumer items, as discussed in Chapter 5. Secondly, prices at the end of the 30 day period are used as a key input for the second controller and should thus be close approximations of clearing prices at this point.

The second controller adapts the plan target based on a comparison of prices and opportunity cost valuations. If the price of an item is above its (adjusted) OCV, the target entry for that item will be increased. If it is below, the entry will be decreased. The ideal equilibrium condition is reached when prices and OCVs match. This is interpreted as meaning that the produced mix of consumer items matches the actual needs of consumers and thus no further change in the plan target is necessary.

While it might not be possible to reach perfect equilibrium, ideally, we should see a prompt and close convergence. The key question then is by how much must prices or target entries be adjusted each time in order to ensure the best possible convergence? The simulation uses a proportional controller with a proportional factor of 0.3 for the adjustment of prices. This means that a 10% difference between demand and supply would lead to a 3% adjustment of prices and so on. For adjusting the plan target an on-off controller is used instead. This means that the amount by which the target entry is increased or decreased is independent from the difference between market clearing prices and OCVs. It only matters which one is higher, not how large the difference is. The target entries will always be changed by +/- 1% of their previous value.

The proportional controller and on-off controller were chosen because they are simple and work well enough for the small sample economies considered. But in economies with a larger product diversity, multi-variable dependency makes convergence somewhat trickier. Consider the case of credit prices. Demand for a consumer item will not only depend on the price of that product, but also on the price of other products that consumers could acquire instead. Changing the price of one item could thus potentially affect the demand for all consumer products. Balancing demand with supply thus becomes a lot trickier. The kind of controller that is best depends largely on the behaviour of consumers and the according price-sensitivity of demand. An adequate controller must thus be chosen based on an empirical study of consumer responses to price changes. Such a controller might well be more complex than the simple controllers used here. Instead of being directly proportional to current differences between supply and demand, past responses might also be taken into account, such as in a PID controller ([Aström & Hägglund 1995](#)).

It might also be sensible to make use of machine learning or an artificial neural network to determine adequate adjustments of prices or plan targets. The algorithm or neural network will take in information about how demand responded to prices in the past and can thereby infer an adequate adjustment of current prices. As more information becomes available the algorithm or neural network will become increasingly better at making predictions about which prices will lead to a balancing of supply and demand. A potential problem with this solution is that there might not be enough training data available in order for the system to learn how to make accurate predictions.

7.5.2.2 Computational Complexity

A further potential problem that can be identified with the simulation is the computational complexity of the planning algorithm. Should the run time of the algorithm scale exponentially with the number of products or production methods, then even an advanced computer might be unable to determine a production plan for a modern economy in an acceptable time period. [Nove \(1983, 103\)](#), citing a Soviet source ([Antonov 1965, 23](#)), contends that calculating an accurate and detailed production plan could take millions of years. Using an experimental method, I have determined that calculating a production plan in the manner described in my simulation can in fact be done in polynomial time and that the complexity is thus in principle tractable. Further reducing the run time is nonetheless desirable. I will briefly explain my methodology, show the results and discuss possibilities for further improving the run time of the algorithm. In Section 7.6, I will also discuss the relevance of computational complexity to the socialist calculation debate.

[Klee & Minty \(n.d.\)](#) show that the simplex algorithm, on which the used linear programming solver is based ("[lp_solve](#)" n.d.), runs in exponential time in some worst case scenarios. However, this is rarely the case in real world applications, where the algorithm usually runs in

polynomial time and is thus generally tractable (Borgwardt 1987). One factor that may serve to reduce the complexity of the kind of economic planning problems considered here is that many elements of an input-output table will be null. That is because it is not the case that every product requires every other product to make. While the total number of elements in an input-output table is given by n^2 , where n is the number of items or industries considered, Reifferscheidt & Cockshott (2014) demonstrated that the non-null elements tend to follow $n * \log(n)$.

In order to experimentally determine the computational complexity of the considered planning problems, I generated random test economies of various levels of complexity. These were then translated into a linear programming problem, using the same method that is used in the simulation. Time measurements were taken just before and after the problem is then solved using `lp_solve`.

For a given number of products, a random input table and a random output table specifying three distinct production methods for each product were generated. Each production method only produces that one output, which is specified by an according non-null entry in the output table. The general form of these tables is the same as in the simulation described above. This means that the upper section of the input table specifies the required input of produced items, while the lower section specifies the inputs of non-produced resources. The number of non-produced resources is set to be one tenth of the number of products. In accordance with the findings by Reifferscheidt & Cockshott (2014), the total number of non-null elements in the produced part of the input table is given by $21 * n * \log(n)$, where n is the number of products. The non-null elements for non-produced inputs is one tenth of that. The non-null elements were evenly divided among the various production methods. Each non-null element in the input table is given by a random integer between 1 and 10.

For the output table, the identity of the non-null elements is sufficiently determined by the fact that for each product there are three production methods which only produce that one product. The value of these elements, i.e. how much this method produces at an intensity of one, was also given by a random integer. The value range for those integers was between $231 * \log(n)$ and $462 * \log(n)$. This range was chosen, so that the total output volume of the economy is higher than the input volume. While this does not fully guarantee that the economy can produce a surplus of all products, no infeasible economies were noticed. So in all of the observed economies, it was possible to produce more of all products than was being used up and an optimised production plan thus led to a positive value of the objective function. It should be noted that the size of the surplus that can be produced might be another factor influencing the run time of the linear optimisation. The complexity of the optimisation could thus differ if different ranges for the output values are chosen.

As in the simulation, the objective function is given by the surplus of the first product in the

input table. The resource vector and target vector are randomly generated. Each entry of the resource vector is given a random integer between $210 * \log(n)$ and $420 * \log(n)$, providing sufficient resources for some production to take place. The target values are random integers between 0 and 10, except for the first entry, for which the value is between 1 and 10, so that the objective function shall not be equal to zero.⁴

The results are shown in Figure 7.4. On a log-log scale, the data points appear on a straight line, which shows that the relationship is polynomial. The line of best fit has a gradient of 3.3, which suggests that the relationship between n and time t is of order $n^{3.3}$. This is consistent with similar findings for economic planning with `lp_solve` by Cockshott (2019). It must be stressed that this is for a single optimisation. Since calculating the value of each product requires an additional optimisation, we can expect the algorithm for valuation to be of order $n^{4.3}$. It must also be noted that the precise order may depend on other factors than n , such as the relative values of inputs and output of production methods and thus the ability of the economy to generate a surplus.

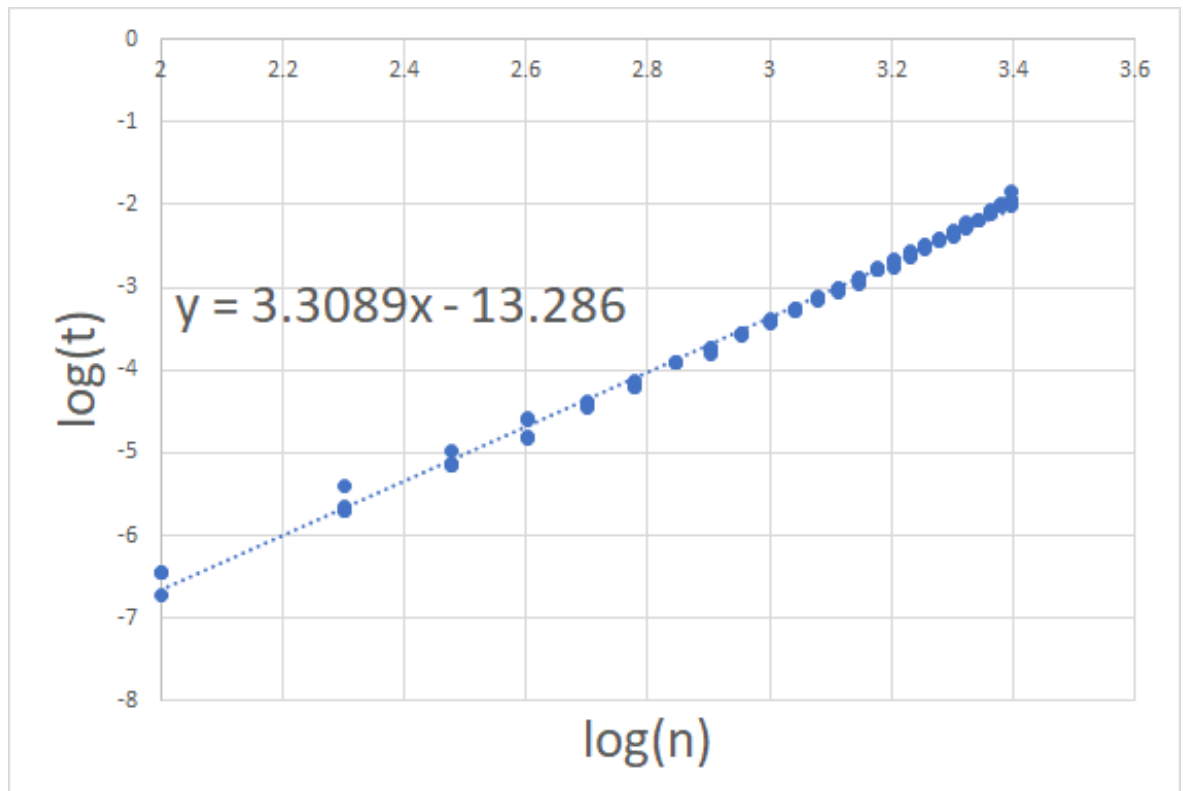


Figure 7.4: Graph showing the run time of a linear optimisation for randomly generated economies with n products. X-axis shows the value of $\log(n)$, Y-axis shows the value of $\log(t)$, where t is the time measured for the optimisation. The data points closely follow a straight line, which suggests a polynomial relationship between n and t . A linear best fit with a gradient of 3.3 is shown, suggesting the relationship between n and t is of order $n^{3.3}$.

While these results make it clear that the proposed planning algorithm is not exponential, reducing the order of the polynomial is nonetheless desirable. I will point out two ways that this

⁴See the description of the simulation for why the first entry of the target vector must not be 0.

might be achieved. The first is to use a more efficient optimisation algorithm than `lp_solve`. One possibility is the harmony algorithm first proposed by [Cockshott \(1990\)](#), which [Cockshott & Cottrell \(1993\)](#) also consider as part of their labour value model. [Cockshott \(2019\)](#) determined that the harmony algorithm is of order n^2 and that with the algorithm a computer with 1000 threads could determine an optimal production plan for an economy with 200 million product types in 22 minutes. This is particularly impressive, as this considers plans which span over five plan periods, rather than the single plan period that I have considered. This allows to plan production in order to optimise output over several months or years, rather than each month or year individually.

Unfortunately, 22 minutes is still a very long time when one considers that one optimisation has to be carried out to calculate the value of every single one of the 200 million product types, or at least for the once that require valuation (such as consumer products). My second proposal is thus to use a different method of valuation than the one originally proposed here. I think it was useful for the purposes of this investigation to directly consider the cost of a product in terms of changes in plan fulfilment. I consider this to be the most direct measure of the lost opportunity that can be associated with the production of any one product. But in practical terms, this is probably not feasible due to computational limitations.

One alternative way of determining valuations that might be worthwhile considering in the future is to start by determining the opportunity cost of key inputs, rather than outputs. The valuations proposed here consider changes in the value of the objective function when a single unit of a consumer product or some output is made available for free. Input-based valuations would use the same principle to determine the valuation of key inputs, such as labour, energy or emission rights, land or machinery. Valuation would consider marginal changes in the objective function when a single additional unit of the input is made available. The advantage is that for this optimisations would have to be carried out only for these key inputs. The value of other products, in particular consumer products, could then be calculated based on their input requirements and the valuations of these inputs. This would be a much simpler process which is analogous to calculating labour values by solving a set of linear equations. The difference is that instead of a single input, one would consider a variety of inputs which are weighted based on their opportunity cost. This might achieve a similar result to the valuations used in my simulation, since other production requirements than labour, such as harmful emissions, will also be considered.

Overall, it is clear that the algorithm proposed here is far from perfect from a computational standpoint and requires various changes and improvements to be practical in real world applications. It is, however, also clear that solving the kind of economic planning problems considered here is not at all beyond the reach of modern algorithms and computing technology. Computational complexity might be a hurdle for socialist planning, but it is not an insurmountable obstacle.

7.5.3 Testing

One of the central purposes of the simulation was to test how the OCV model and LV model would react to the introduction of a cap on greenhouse gas emissions. The results for the first sample economy were perfectly consistent with the intuition I expressed: that the OCV model would see a shift towards production of more environmentally friendly products, while the LV would not. The results for the second test economy somewhat dilute this, since when alternative methods of production were introduced both models saw a similar shift in the plan target. This is because the higher average labour time used for product A led to an increase in its relative labour value and thus a reduction in its plan target entry for the LV model. But the third test economy showed that the effect of this is inconsistent and may in fact lead to a shift in the plan target towards more emission-intensive products.

I will now argue that the OCV model response to the emission constraint is the more appropriate one. This is not because the plans arrived at by the OCV model somehow have lower emissions. The overall emissions in both models are the same. Instead, the point is that the OCV model provides consumer products which are more appropriate to the needs of the people. It is thus able to maintain a higher standard of living despite the emission constraint. This is good in itself, since people will be better positioned to satisfy their immediate consumption needs. The OCV model may indirectly also have a more positive effect on the climate, because when the effect of an emission constraint on material consumption is reduced by a shift to lower emission products, people might be more willing to accept stricter emission constraints to mitigate climate change.

Let us consider the first test economy. Both products require an equal amount of direct and indirect labour, but product A requires more energy and thus involves more emissions. Producing one unit of A thus takes away more of the limited emission rights than producing one unit of B. Or in other words, with the same emissions we can produce more units of B than of A. This means that by producing Bs instead of As we can produce more overall without violating the emission constraint. This does not necessarily mean that we should switch to producing significantly more Bs. Whether or not this should be done depends partly on the usefulness that these products have to consumers. But it is entirely plausible that there are cases where consumers will feel that they benefit more from a slightly larger amount of Bs than a smaller amount of As, even when they would have been indifferent or would have had a slight preference for As if the choice was between equal amounts. In the opportunity cost valuation model, the plan target will take this into account, and this is why we see a small shift towards production of Bs.

The choice presented to consumers in the LV model is a different one. Instead, consumers can still choose between equal amounts of As and Bs, since valuations and thus equilibrium prices are the same for both products. The model thus does not take into account that we can

actually produce slightly more of B with the same emissions that it takes to produce one unit of A. That some consumers might see greater use from the larger amount of Bs is thereby not reflected in the choice of the plan target.

On a more generalised level, this argument rests on the basic idea of decision-relevant opportunity cost that we have already explored in Chapter 6. When faced with the decision of setting a plan target, i.e. proportions at which consumer products are to be produced, we have to consider the opportunity cost of producing more of any particular item. That is because the opportunity cost reflects the alternative to that option, and ultimately our choice is between an option and its alternatives. The OCV model ensures that the choice of the plan target reflects the usefulness that consumers attribute to a product in comparison to its opportunity cost.

This basic argument for the OCV model does not rely on the empirical results from the test economies, but its implications are demonstrated by it. Nonetheless, the empirical results tell us something very important: the outcomes of the OCV and LV models differ significantly. This means that insofar as we accept the argument for using OCVs, labour values cannot be used as a proxy for OCVs, since this will not necessarily lead to similar results. Using labour values would be computationally simpler, as calculating them does not involve any additional linear optimisations. But since the two are clearly distinct such a simplification would yield a different outcome, which would be less desirable than the outcome of the OCV model.

7.6 Philosophical Relevance

I will now explain how the simulation is relevant to the overall philosophical argument of the thesis. My claim is that the model tested in the simulation directly refutes Mises's claim ([von Mises 1920, 1922](#)) that economic rationality is impossible in a socialist economy. It demonstrates how a planning system based on linear optimisation can combine instrumental rationality and value judgements which influence the plan by affecting both constraints (for example through deliberate environmental limits) and the choice of the plan target (through individual consumption choices).

The use of environmental constraints in combination with opportunity cost valuation also offer an alternative to market-based approaches to environmental economics. On the one hand, it serves as an alternative to valuating the environment or environmental damage based on market prices. On the other hand, and this is directly relevant to the question of economic rationality, it allows an efficient and rational use of productive capacities within environmental limits without market mechanisms. The standard approaches in environmental policy to reducing emissions are carbon taxes or emissions trading ([Ghandi & Cuervo 1998](#), [Bohm 2000](#), [Stavins 2001](#)), both of which rely on market mechanisms to ensure efficiency. While Mises did not explicitly raise the question of emissions reduction, the environmental question has

played an important part in the socialist calculation debate from the very beginning (O'Neill & Uebel 2015). It is important that any model of a socialist economy can address the issue of emissions reduction and I have shown how my model is able to contribute to this. This is directly relevant to the question of economic rationality, since productive capacities must be used rationally in the face of environmental limits. The model achieves this by determining an optimised production plan within deliberate environmental limits and then shifting the plan target based on consumer demand and opportunity costs which factor in environmental constraints.

The model also integrates some of my thoughts on distribution under socialism presented in Chapter 5. In particular, the model makes use of credits to distribute consumer goods. The prices of these goods are regulated towards clearing prices. I have argued with Dworkin (Dworkin 1981; Dworkin 2002, 65-73; Dworkin 2011, 356-358) that this is necessary to achieve an equal distribution. But the clearing prices also tie in with my discussion of economic rationality, as they at the same serve as signals for consumer demand. They are compared to opportunity cost valuations in order to adjust the plan target, which specifies the proportions at which various consumer products are produced. Clearing prices thereby help make a rational choice of the planning target, the fulfillment of which can then be optimised using linear programming or some other method of optimisation.

While the simulation helps to show that computational complexity is not a major issue for economic planning, or at least not one that cannot be addressed with sufficiently efficient algorithms, some representatives of the Austrian school of economics have expressed scepticism about the relevance of this to the socialist calculation debate. In response to Cockshott & Cottrell (1993), Horwitz (1996) claims that, 'Cottrell and Cockshott treat as a computational issue what is really an epistemological one' (Horwitz 1996, 71). Similarly Boettke & Subrick (2002) argues that, '[c]onfusing questions of context with questions of computation distort the nature of the task that is being addressed in economics' (Boettke & Subrick 2002, 56). The reason that they do not see computation as the issue is that they adhere to Hayek's information argument (Hayek 1945, 1981, 2002), rather than Mises's calculation argument (von Mises 1920, 1922). For them the issue is the transference and use of dispersed information. Whether a mathematical problem can be solved by a computer in an adequate time, does not say anything about whether the formulation of the problem takes into account all relevant economic information and whether that information can really be collected and centralised for the algorithm to do its work. So Horwitz (1996) and Boettke & Subrick (2002) are right that computational complexity is irrelevant to Hayek's information argument.

Since my purpose is not to respond to Hayek, this is not really an issue for me. I will nonetheless reiterate that I see no problem in centralising the relevant economic information that is required either for the TNS model (Cockshott & Cottrell 1993) or my own model presented here. Requirements for the input and output of various production techniques, as well as in-

formation about resource stocks, are not tacit at all and could easily be communicated to a planning agency using modern telecommunication technology. Other than that, it is not clear, at least not to me, what information would be required by planners in order to determine an optimised production plan and why such information should be impossible to gather. Perhaps Hayek's capitalist entrepreneur ([Hayek 2002](#)) is faced with a different kind of problem, requiring different, more localised and tacit information. That does not mean that the same kind of information would be required by a central planning agency.

Computational complexity is somewhat more relevant to Mises's calculation argument ([von Mises 1920, 1922](#)), since this really is about the nature of planning decisions in a complex economy. However, Mises's point does not seem to be that any particular planning algorithm has an intractable computational complexity. If it was, he would have done a very poor job of making this point, since he includes no formal study of any algorithm or computational problem. This is of course not to be expected, given the time of his writing, but it demonstrates that any valid point that he has made cannot really relate to the supposed complexity of any algorithm or computational problem.

Instead, I consider Mises to have made a point about the nature of rational choice, as I have discussed in the previous chapter. The problem is not that some calculation problem is too complex to solve using mathematical or computational methods, but that in the absence of a single unit of comparison, there is no problem to be solved. With monetary valuation of goods, provided by market prices, we have a mathematical problem that can in principle be solved, which is to maximise profit in terms of monetary value. But without such valuation, there is nothing to solve and thus no way to choose between countless options. I consider this to be the core of Mises's argument, independently of whether we think his focus was rational choice about ends ([O'Neill 1996](#); [O'Neill 2003](#), 112-128; [O'Neill 2006](#)) or rational choice about means ([Greenwood 2006, 2007b,a](#), [Cockshott 2010](#)). If there is no computational problem that could be solved, then it does not matter what the computational complexity of that non-existent problem is. The issue is that we, or any algorithmic methods we might employ, have no metric by which to choose between two or more options.

It is precisely this, where I consider my simulation to be the most relevant. The simulation demonstrates, how the choice of an economic plan can be made in a rational way. The primary point is not that the algorithm has a sufficiently low computational complexity, but that it makes it in principle possible to make rational decisions about production planning. Mises is wrong when he argues that rational choice requires prior valuation of goods through the market. Even more than that, the model addresses the strongest interpretation of Mises's argument that I have discussed in the previous chapter, which is that the problem of rational choice is one of both instrumental and value rationality combined. Both the TNS model ([Cockshott & Cottrell 1993](#)) and my own model address this by providing a method by which consumer choices and political choices about environmental limitations can be reflected in

an optimisation problem. The advantage of my model is simply that it uses a more adequate measure of cost, which means that factors other than labour, such as the use of limited emissions rights, are more adequately reflected in the choice of the plan target.

7.7 Conclusion

In this chapter, I developed some of the philosophically grounded ideas on socialist economics from the previous chapter into a simple model that can be simulated on a computer. Following up from the discussion of economic rationality in the previous chapter, I have demonstrated in more technical terms how a socialist economy might be planned and in particular how planning might be made responsive to consumer demand. By linking the plan target to a comparison of market clearing prices and opportunity cost valuations, we can solve the dual problem of instrumental and value rationality in a socialist economy. Linear optimisation ensures that available means are used to maximally fulfil a prespecified plan target, while the plan target is adjusted on the basis of both the consumer demand for various items and the opportunity cost of their production.

Results from the simulation for small sample economies clearly differ from results that would be obtained with the labour value model of [Cockshott & Cottrell \(1993\)](#). Given a constraint on allowable GHG emissions, the OCV model appropriately takes these into account in valuation and thus tends to shift production towards lower emission products. While both models can effectively implement an emission constraint, the OCV model arguably does so while using limited emission rights to produce a more appropriate social product. This allows to better satisfy consumer demand and thus maintain a higher standard of living in the face of environmental limits.

A major limitation of the simulation is that it does not allow for growth or changes in the composition of capital stock. Mises's calculation argument might be defended on the grounds that an economy that dynamically adjusts capital stock is more complex than one with static capital stock. The simulation thus does not show that rational planning is possible once changes in capital stock are accounted for. This argument would perhaps best be addressed by expanding the model to allow for dynamic capital stock. But even without such a model fully developed, proponents of the calculation argument have to provide specific reasons for why economic rationality should be (practically) impossible, rather than simply more difficult in the dynamic model. Without any compelling reasons, the calculation argument would cease to be a convincing argument against a socialist economy. Rationally planning a socialist economy might turn out to be difficult (there is no doubt in my mind that it is), but not something that is principally impossible.

Nonetheless, several issues require further attention before the model developed here might

be put into practice. The model must be adapted to allow for changes in capital stock. One way this might be done is to consider multi-year plans in which one year's product can contribute to the capital stock of the next year (Cockshott 2019). Furthermore, adequate controllers must be found that allow for prices and plan targets to converge towards their equilibrium conditions as much as possible. The computational complexity of the model can be reduced through alternative optimisation algorithms (Cockshott 1990, 2019) and alternative methods of valuation.

Overall, the simulation demonstrates that rational economic planning cannot be dismissed as outright impossible. There are specific technical problems that must be addressed, such as the convergence of controllers and computational complexity. But these problems do not give credence to the outright rejection of socialism by Mises and his followers. Instead they necessitate the investigation and technical analysis of possible solutions.

Chapter 8

Conclusion

At the beginning of this thesis, I said that socialism and socialist economic planning have been dismissed too quickly. While it would not have been possible to address each and every one of the countless objections to socialism out there, I have shown that two influential objections are not successful. While Nozick's deontological objection ([Nozick 1974](#), 162-164) fails completely, Mises's calculation argument ([von Mises 1920, 1922](#)) should be taken more seriously. I have taken it seriously, but nevertheless refuted it, by showing that a socialist economic system that allows for rational economic calculation is in principle possible.

Throughout the thesis, I developed a hypothetical model of a socialist economy which deals with two aspects of the economy: distribution of consumer goods and planning of production. Regarding distribution, I have shown that a distribution based on tokens is a good way of realising the welfarist demand that goods be distributed so that they satisfy the greatest need. This proposal has a lot in common with socialist labour token proposals, as discussed by [Marx \(1999a, Part 1\)](#). But to make sure that this really works as intended, two things must be true. First, tokens must be distributed in the right way. If one person has an abundance of tokens but much less need for them than another person, this will not lead to the best satisfaction of needs. In general, an equal distribution of tokens is most likely to yield the best satisfaction. However, citizens should be allowed to substitute token income for additional leisure time if they reckon this allows them to lead a happier life. There must also be accommodations for people with special needs, such as for medical treatment. One way to do this is to provide medical treatment independently of the token system – free at the point of use.

Secondly, token prices, so the rates at which tokens can be redeemed for particular consumer products, must also be determined in an appropriate manner. That is because what ultimately matters to need satisfaction is the distribution of actual stuff – not tokens. It must thus be ensured that an appropriate distribution of tokens also translates into an appropriate distribution of consumer goods. I have shown that the best way of doing this is by using market clear-

ing prices for consumer goods, because these most appropriately reflect the decision-relevant opportunity cost of consumption.

Regarding production, I have shown that planning is in principle capable of satisfying even the strongest version of the calculation problem. This strongest version combines the concepts of instrumental rationality and rationality about ends. The problem is thus, how, in the absence of markets, can we rationally choose between competing means in the face of countless ends that could be achieved by them. Or alternatively, how, in the absence of markets, can we rationally choose between competing ends in the face of the countless means at our disposal for achieving various ends.

The solution, I have argued, is to link mathematical optimisation of production to the changing demand of consumers. [Kantorovich \(1960, 1965\)](#) has shown that using a non-monetary objective function linear programming can be used to calculate an optimised production plan. The objective function is given by the physical production output, which is constrained to set proportions between the various kinds of products. An optimised plan will thus produce as much as possible at these proportions, given available production methods and resources. [Cockshott & Cottrell \(1993, 118-126\)](#) have shown how such optimal planning can be linked to consumer demand. The proportions of various products are to be changed depending on whether market clearing prices for a product are high or low. Cost valuation, under their proposal labour values, serve as a reference for whether a price is high or low.

What I have done is show that such an approach can indeed be a solution to the strongest version of the calculation argument. While optimisation ensures instrumental rationality, the comparison of market clearing prices and cost ensures rationality in the choice of ends. By taking into account cost, the choice of ends also reflects the means necessary for achieving those ends. However, this depends crucially on what measure of cost is used. In the computer simulation, I have shown that different measures of cost valuation can yield completely different results in terms of the chosen proportions.

The simulation also showed that labour values do not sufficiently consider other factors than labour such as emissions. There is thus need for an alternative system of valuation. I argued that this should be based on the decision-relevant opportunity cost and have proposed to quantify this in terms of changes to the optimised objective function. I have shown that in combination with an emission constraint, this can increase the cost valuation of emission-intensive products, which in turn leads to a shift in the plan target towards low-emission products. Such a system of valuation can thus be seen as an alternative to market-based approaches to environmental costing, such as emissions-trading or a carbon tax ([Ghandi & Cuervo 1998](#), [Bohm 2000](#), [Stavins 2001](#)).

The discussions of distribution and economic rationality in the thesis are linked in an impor-

tant way. I have argued that market clearing prices, which balance supply and demand, are the best token prices in terms of the distribution of consumer products that they lead to. At the same time, they can be used as a signal for the demand for various consumer items. The planning target is adjusted based on a comparison of the market clearing price for an item and its cost valuation. Clearing prices thus also serve an important function in determining the production plan.

The proposed system represents an alternative to the market-capitalist system, an alternative which is able to accommodate and overcome the calculation argument. Productive resources are not allocated using markets, but through an algorithmically optimised production plan. A mechanism resembling markets in some ways is used to distribute consumer products, but not productive resources. However, unlike in a market this mechanism is not based on exchange of private holdings. Instead, it is used to distribute the products of socialised production to end consumers.

While there no doubt remain open questions and problems, this thesis re-establishes socialist planning as a serious alternative to market capitalism, an alternative that ought to be given further consideration. While this thesis has shown that socialism can in principle overcome rationality challenges to socialism, developments of the recent years and decades have fundamentally changed the technological basis on which economic planning can take place. It is thus time to further investigate these new technological possibilities for economic planning. Planning deserves to be evaluated not on the basis of what is possible in the most primitive of societies, but on the basis of what can be achieved with contemporary and emerging technology.

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