



MASTER THESIS

Frej Leilund and Jonatan Møller Sousa

CAPITALISM AND PLANNED ECONOMIES

How Economics can Contribute to the Understanding of Capitalism

Thesis supervisor: Jacob Weisdorf

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ABSTRACT

This thesis uses modern economic theory to critically analyze capitalism where we by capitalism understand *an economy where the bulk of production is organized by private enterprise*. The aim is to understand the consequences of this exact social construction. To do so, and appraise the economic and welfare consequences of capitalism, we need to have a benchmark economy. As benchmark economy we have chosen the exact opposite of capitalism, a planned economy. We define this as *an economy where the bulk of production is organized by government institutions*. The defining characteristics of both capitalism and planning are then the ownership of the means of production. In capitalism there is private ownership of the means of production, while in a planned economy there is public ownership of the means of production.

The motivation for the thesis is that it is of paramount importance to critically reflect on the society we live in and to understand the consequences of the social constructions we choose to have. In this sense choose is a very important word; no way of arranging the institutions of society are given by nature. Societies are built by the people who live in them, and we therefore feel that it is the duty of the social sciences to critically assess what consequences these institutions have, both for the individuals and for society as a whole.

The thesis is organized into three parts. The first part will briefly introduce and highlight the ability of modern economic theory to critically analyze society. The second part will then turn towards an understanding of earlier debates on capitalism. Finally, the third part contains our contribution towards using economics to try and understand the economic consequences of capitalism.

Part One – Economics as a tool for accommodating a discussion where political emotions are present

When discussing whether our society should be either capitalistic or a planned economy, strong emotions are invoked. We call these political emotions and they make participants feel a strong connection to specific conclusions. Political emotions make it difficult to have a fruitful discussion that may lead to a better understanding of our world. But we need political opponents to engage in a discussion if we want to increase

our understanding. If there are no confrontations between political opponents then it is much more difficult to localise bad arguments. A political opponent is better at revealing non-consistent arguments, because she has the incentive to scrutinize all arguments that is counter to her cause.

The economic science is a well suited tool for accommodating a discussion where political emotions are present. The long tradition of rigid logical argumentation in economics and a focus on economic efficiency creates a good the basis for a fruitful debate.

Part Two – Review of the literature

Even though economics is well suited for a constructive debate on capitalism, the debate has been largely neglected in the last two decades. Furthermore, the contributions that the economic science has produced do not exploit the potential that economics has with regards to the accommodation of a fruitful discussion. The historic contributions from economics rely too heavily on either faith or ethics, neither of which are accommodating in a debate where strong political emotions are present.

The historic contributions have predominantly been focused on critiquing planned economies. The historic focus on planning is reasonable, the idea had common support, and at the time, there were large and geopolitically important planned economies. However with the demise of the Soviet Union the debate seemingly stopped without providing us with deeper insights towards the merits of capitalism.

The calculation debate

The calculation debate is the largest contribution from the economic science to the discussion on capitalism and planning. The initial contribution from Ludwig von Mises on economic calculation in the socialist commonwealth and his later treatise on human action claims that only prices derived from agents, endowed with private property to the means of production, and trading on a market will correctly reflect the collective objective valuation of any given good. Absent of such a process any prices will, according to Mises, be inherently arbitrary and therefore rational economic calculation will be impossible. If Mises' argument is right then the debate stops because capitalism always will be superior to a planned economy. We show that that without a specified price-mechanism Mises' argument is inherently faith-based.

Writing against Mises, Oscar Lange proposed a model of market socialism. Lange wrote within the orthodox economic theory of the day, and demonstrated that by replacing the Walrasian tâtonnement with a centralized planner that sets prices by trial-and-error, market socialism will be as efficient as the capitalistic market equilibrium. However Lange's market socialism depends crucially on the first theorem of welfare economics; and therefore stands and falls with this theorem.

The final contributor to the calculation debate is Friedrich August von Hayek who, building on Mises, argued that the market works as a mechanism for aggregating and dispersing knowledge. Central to Hayek's knowledge argument is that the individual economic agent must be able to act when faced with changing conditions. Hayek therefore calls for a decentralization of the decision process. This critique ends up targeting centrally planned economies and is not an argument against decentralized planned economies.

Central to our review of the calculation debate is that we turn to the original contributions and analyze them under a new light – the purpose of which is to open up the debate from the dead-locked state it has been in since the mid-20th century.

Modern arguments on capitalism

We finally cover some of modern economics' contribution to the debate on capitalism. Business cycles and non accelerating inflation rate of unemployment (NAIRU) are economic phenomena that have been shown to be inherent in capitalism but avoidable in planned economies.

Non-economic arguments

In addition to the economic arguments there exist a number of contributions on the normative merits of both capitalism and planning. We touch upon the central non-economic arguments that have been proposed by economists. Milton Friedman for example argues that government activity in itself constitutes an assault on the personal liberty of individuals. Hayek argues that socialism necessarily leads to a totalitarian regime – that socialism is the road to serfdom.

Part Three – Capitalism and modern economics

In a number of different cases we analyze the effects of the capitalistic market equilibrium on economic growth. We use these analyses as a platform for highlighting the consequences of choosing one social structure over another.

Research and development

The private incentive to invest in research and development is inefficiently low. This is because knowledge has characteristics of a pure public good – and because there are externalities both positive and negative in the production of knowledge that are intensified by the secrecy of private firms. Intellectual property rights such as patents help create a private incentive to do research, but it also creates disincentives – hold up problems is an example. A government run firm has incentives to invest in public goods – and can internalize externalities.

Cost minimizing

We discuss the assumptions one would need in order to conclude that a private capitalistic firm is more cost efficient than a government controlled firm. Furthermore we argue that private firms have an incentive to spend resources on acquiring market shares from each other. These resources constitute wasteful spending on a macroeconomic level, and we thus show that there is reason to believe that a planned economy will be more cost efficient than capitalistic.

Economics of scale

A competitive capitalistic market can force firms to keep prices around the cost of production thus resulting in high economic efficiency. However given the presence of scale economics it is not efficient to have many competing firms. In order to fully utilize economies of scale the efficient productive unit should be very large. However with few participants on a market this means that individual firms have high market power and they can use this market power to take higher prices – thus resulting in suboptimal economic efficiency. This shows that in a capitalistic market with profit motivated firms there is a trade-off between utilizing scale economics and ensuring competitive pricing.

By comparison; firms in a planned economy are not profit-motivated, so they will not have the incentive to exploit monopoly market power and in a planned economy the number of firms can safely be restricted to the socially optimal level.

Children and work-life balances

When the capitalistic firm decides upon its demand for labour it has but one motive; how to maximize its profits. In societies where welfare is socialized – as in most modern, western countries – this can have tremendous consequences. When welfare is socialized the direct coupling between the provision of – and the derivation of utility from children is removed. This has the consequence that children in modern societies can be analytically understood as akin to public goods. The elderly of society are supported by the children irrespective of their own production of children.

The combination of socialized welfare and profit motivated firms can have tremendous consequences for society. The firm will act as to maximize its profits and thereby give the agents in an economy the incentive to work more or perhaps even opt out from having children.

When the firm is capable of controlling wages it also has the ability to influence agent's preferences for work. By giving an increasing return to career the firm can make it optimal for agents to working harder.

The capitalistic profit-motivated firm will essentially increase the opportunity costs associated with both having children and raising them.

In contrast to the capitalistic firm, the planner has every incentive to consider the future consequences of her actions. The planner will therefore try to ensure both an adequate provision of children and is able reward parents for spending time with small children. The planner can effectively remove the current career-children trade-off.

Coordination failures

The atomistic nature of capitalism can create problems of coordination. When the prerequisite for attaining an efficient outcome is, that all agents choose a certain strategy and that it is only optimal to choose that particular strategy if all other agents choose the same strategy. Then there can be problems of coordination failure. These problems are more persistent when the risk facing the individual agent rises with the overall efficiency of the subsequent equilibrium. Also strategic uncertainty caused by perceived irrationality can have the same effects. And if new equilibria emerge it can be hard for agents to coordinate on shifting to this new and superior state. Switching costs

are particularly important in this respect. In a planned economy, a central authority can help firms coordinate and thereby increase efficiency.

The arguments that we present all point to the same conclusion, that capitalism exhibits less efficiency than a planned economy. The comparison of capitalism and planned economies that we present is made using the tools of modern economics, and one is therefore able to follow our line of reasoning. By using our contributions as a point of departure it is possible to have a discussion amongst political opponents of whether capitalism or planning is the most efficient economic system.

PREFACE

Pursuant to the study guide's requirement that any counselling from outside parties must be declared, the authors hereby declare that no outside party has counselled on the subjects in the thesis.

* * *

Pursuant to the study guide's requirement that external affiliations are declared, the authors declare the following external affiliations:

Jonatan Møller Sousa has no external affiliations.

Frej Leilund is affiliated with the Centre for Expenditure Policy, Danish Ministry of Finance.

* * *

Pursuant to the requirement, that the author to individual contributions must be identified, the list below identifies the contributions made by each author.

Frej Leilund	Sections 1, 7, 8, 10, 12, 13, 17, 19, 22, 23, 25 and 26
Jonatan Møller Sousa	Sections 2, 3, 4, 5, 6, 9, 11, 14, 15, 16, 18, 20, 21 and 24

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1 INTRODUCTION

In this thesis we want to show how economic theory can be used to analyze capitalism and planned economies. By capitalism we understand that *the bulk of production is organized by private enterprise* and in a planned economy the *bulk of production is organized by government institutions*. The questions that we will address in our thesis are:

How can economic theory contribute to the understanding of capitalism and planned economies?

And corollary:

How can this understanding contribute to the debate of capitalism versus planned economies?

The main goal of our analysis will be to contribute to the understanding of the society in which we live. However trying to understand capitalism in itself, without a basis for comparison, is meaningless. This is the reason behind our use of planning; it is a tool to highlight the economic consequences of capitalism.

The motivation for the thesis is that it is of paramount importance to critically reflect on the society we live in and to understand the consequences of the social constructions we choose to have. In this sense choose is a very important word; no way of arranging the institutions of society are given by nature. Societies are built by the people who live in them, and we therefore feel that it is the duty of the social sciences to critically assess what consequences these institutions have, both for the individuals and for society as a whole.

The thesis is organized into three parts. The first part will briefly introduce and highlight the ability of modern economic theory to critically analyze society. The second part will then turn towards an understanding of earlier debates on capitalism. Finally, the third part contains our contribution towards using economics to try and understand the economic consequences of capitalism.

In part one we set out to discuss how political opponents can have a meaningful dialogue on topics which are politically and emotionally laden. We suggest that the modern economic science, since its method is strict and logical argumentation, is a

perfect tool for shedding emotions from the debate. We then proceed with a more precise specification of what in this thesis is meant by both capitalism and planned economies before we illustrate the difficulties in assessing this question empirically.

In the part two we revisit the contributions on capitalism and planning from the major icons within the economic science. We cover Karl Marx's economic critique of capitalism and show how the consequences of newer price-theory affect his conclusion. We continue with an investigation into one of the most important controversies within the field of comparative economics, the calculation debate. We apply a critique, based on insights from modern economics, to the contributions in the calculation debate.

After the calculation debate we turn towards a number of non-economic arguments on capitalism and planning put forth by famous economists.

In part three we use the tools of modern economics to critically investigate the institution capitalism. We set out to understand the effects of the profit motivated firm and from atomistic competition.

The focal point of our analysis is to understand which of either capitalistic or planned economies delivers the highest level of economic efficiency, or in other words, which economic system can deliver the best opportunities for economic growth. The outset for the analysis is the insight that long-run economic growth is only possible with growth in total factor productivity.

We therefore continue with five cases where we analyze the impact of the profit motivated atomistic firm on total factor productivity.

First we ask which economic system can produce the most technologic progress. We consider the incentive of profit-motivated firms to invest research and development, and consider issues arising from introducing patents. We finally consider how a planner will address these issues.

Second, we consider the ability of the firm to cost minimize. We identify three requirements a firm must fulfil to be cost-minimizing. We further consider cost minimizing in the light of attempted business stealing thru advertising.

Third, we analyze the ability of capitalism to exploit economies of scale. When economies of scale are present the optimal number of firms in an economy decrease substantially. However, when the number of firms is limited, the firms will have the necessary market power to monopoly or oligopoly rents. We further compare the efficiency of capitalism and a planned economy in a model of strategic interaction and where firms must incur fixed setup costs.

Fourth, the effects on the provision of, and quality of, children from the profit motivated firm are examined. Most modern, western, countries experience fertility rates below the replacement level and we consider this a point that warrants further analysis. In these countries welfare is socialized, and the employment structures have shifted towards a greater equality between men and women. This has the effect that the opportunity cost of having children is greatly increased. We investigate whether the profit motivated firm acts to reinforce the issue. Finally, we consider a model of interaction between a firm and its employees, where the firm has the ability to use payoffs from a career as an incentive to increase the amount of work and where the amount of work from parents have spill-over effects on child-quality.

Finally, we examine the ability of the atomistic profit motivated firm to coordinate its actions with fellow firms towards ensuring efficiency. We consider cases with the existence of multiple Pareto-ranked equilibria, where risk rises with Pareto-efficiency and where there is strategic uncertainty. We further, consider the effects when new knowledge of more efficient equilibria become available, and analyze the effects of large switching costs.

PART ONE

ECONOMICS AS A TOOL FOR ACCOMMODATING A DISCUSSION WHERE POLITICAL EMOTIONS ARE PRESENT

In this part of the thesis we will discuss how the economic science can be used to accommodate discussion when political emotions are present.

The words 'capitalism' and 'planned economy' are very politically laden. We know that these terms carry a large political history and we will use them regardless because capitalism and planning are concise words to describe the two different economic systems. We do not wish to hide the fact, that there are many strong political feelings involved in this debate. Precisely what we mean by capitalism and planning and why we do not use other words to describe the two systems will be discussed later. First we want to address why this discussion is important.

2 WHY DISCUSSING CAPITALISM AND PLANNING IS IMPORTANT

The question of whether capitalism is a better economic system than a planned economy is hardly ever asked anymore, and few would disagree when we say that the debate is dead. The consequence of not having this debate within economic science is that we prevent ourselves from trying to understand a key institution in our society. This should be a matter of concern, not only for economists, but for everybody who has an interest in trying to understand the world we live in.

To see that we prevent ourselves from analysing the world in which we live, when the debate on capitalism and planning is neglected, one has to agree with the following two propositions:

- 1) Our society, as all industrialized countries, can rightfully be described as a capitalistic economy.

- 2) It is futile to try and understand capitalism in itself – capitalism has to be compared with something.

This means that if the economy is capitalistic and you wish to try and understand it, then you have to compare it to something. Because capitalism means that production is organized in private enterprise it is natural to compare capitalism with an economy where production is organized by publicly owned institutions. The discussion of capitalism and planned economies thus becomes an inquiry into the institution of private property, or more precisely private property of the means of production.

If this fundamental institution of our economy is suspended from critical examination we prevent ourselves from understanding it. We do not believe that the lack of interest from economists, and others, in this debate reflects a lack of interest in understanding the key institutions in our economy. On the contrary, we believe that scholars from all social sciences would agree when we say that it is important to critically analyze institutions such as private property rights to the means of production.

In other words the question *how can we have a meaningful discussion of capitalism and planned economies?* is equivalent to the question *how do we relate ourselves to capitalism in a meaningful way?*

Our focus will be on capitalism while planned economies will be used as a benchmark and are secondary to our discussion. This sets our contribution apart from most of the debate where the focus usually is on the merits of socialism. The historic focus on planned economies was understandable, because there existed large planned economies. Today however the public sentiment favours capitalism and the Soviet bloc has ceased to exist, because of this we find it more reasonable to focus on capitalism.

In treating planned economies as a benchmark we also imply that we are not interested in any certain political reforms or revolutions. Our aim is not to give aid to any political movement.

3 DEALING WITH POLITICAL EMOTIONS IN SOCIAL SCIENCES

When discussing a political question such as whether capitalism is superior to planning or the other way around, political emotions are invoked. The existence of strong emotions presents a difficulty in the debate which needs to be addressed.

First, let us be specific about the term political emotion. Political emotions are feelings that go together with certain political statements. If an argument is presented that show that capitalism is inferior to planning, some will have a positive emotional response and some will have a negative emotional response. These are the political emotions and they present us with difficulties if we want to have an honest and constructive debate that enhances our understanding of the world we live in.

Some political questions provoke more and stronger feelings while other questions do not – the question of capitalism and planned economies usually provokes strong emotions amongst academics and laymen alike. However this should not be a reason to shy away from a debate, because by doing so we prevent ourselves from analysing the institutions we have surrounded us with.

The political emotions create an incentive structure that is harmful to a constructive debate – a debate which could otherwise have increased our understanding of capitalism. Because of the unpleasant feelings a person gets from giving concessions to the opponent side, and the pleasant feelings one gets from being confirmed in her viewpoint, there is risks of having an unconstructive debate.

It would be unconstructive if confrontation with advocates of the opposite view is avoided, however the political emotions would make this desirable. The fear of losing an argument can make it much more desirable to avoid confrontation and the political emotions make it much more pleasurable to preach to the choir – or to have some of your own conviction preach to you. The gathering of people of the same conviction is not accommodating for a critical analysis because no one will have an incentive to disagree. The absence of critical analysis will make it harder to discover which arguments are good and which are not. If we wish to have a constructive discussion that can lead to a better understanding of the world in which we live, we must have a discussion between people with different political emotions.

However, when there is a confrontation between two persons with differing political emotions, no one has the incentive to interact in an intellectually honest debate. This is because the political emotions are connected with the conclusion of the debate while intellectual honesty concerns the form of the debate. With each participant focusing on arriving at the conclusion which produces the most pleasant feelings, they will both have the incentive to divert from an honest discussion. Diversions from intellectual honesty can include every dirty rhetorical tactic for example 'straw man' arguments or 'red herrings'. A straw man argument is when you mischaracterize an opponent's view and afterwards show why this misrepresented view is wrong, while a red herring means to divert the discussion by bringing in unrelated arguments or unrelated information. To see a list of dirty rhetorical tricks see LaBossiere (2004).

To have a fruitful discussion that can lead to a better understanding of an issue, we need to avoid certain kinds of arguments when there are strong political emotions present. Specifically one should avoid arguments that rely on faith and ethical arguments.

A discussion revolving around faith based arguments is unfortunate. The side that the arguments benefits can cling to the argument solely based on faith, and the opposing side can reject it solely based on faith. Faith based arguments are impossible to avoid but they should be kept to a minimum because they are not accommodating for the discussion. The problem is that the incentive structure formed by political emotions creates a deadlock in the debate every time crucial arguments rely too heavily on faith. A faith based argument can therefore only be further developed and discussed within a group of people who have the same convictions.

To see how faith based an argument is one can examine the distance from assumption to conclusion. An assertion that relies solely on faith is one where the conclusion is simply assumed. When there is some distance between assumptions and the conclusion, then one can follow the steps of reasoning and each step, together with the underlying assumptions, can be discussed with intellectual honesty.

Ethical arguments should also be avoided because opponents simply can reject an ethical argument by saying that they feel otherwise. Ethics are too closely related to feelings and are therefore not accommodating in discussions. It is not because ethical claims are unimportant, and it is hard to clearly distinguish ethical claims from other

kinds of claims. However, an argument that relies too heavily on ethics is unfortunate. Think of an argument that tries to prove that either capitalism or socialism is inherently unethical – or evil – these kinds of arguments may be interesting but they are not accommodating in a discussion with participants of an opposing point of view. Ethical arguments will necessarily be developed and discussed within a group of people who have the same convictions. To ensure an accommodating discussion between political opponents, they have to agree on a common goal.

Even when a goal is presented that normally would not be perceived as ethical, similar problems can still arise. Whenever political opponents cannot agree on a common goal they cannot have a fruitful discussion. So as a general definition we can say that an argument relies too heavily on ethics if opponents cannot agree on the goal. If political opponents agree on a common goal then there can be a constructive discussion of how to best achieve this common goal. If only few agree on the common goal it is reasonable to consider the argument as too reliant on ethical considerations.

If we want to understand capitalism we must find a way to accommodate important discussions where political emotions are present. First we have to find an objective which both political sides can agree upon. When discussing capitalism and planning both sides have to agree upon a measurement with which we can determine the better economic system. Next we need to find a way to discuss the subject without ending up in deadlocks.

3.1 Economics can support a fruitful discussion

Economics might be a very helpful tool. Many will agree that economic efficiency is a good thing – all else being equal, nobody would want resources to be used inefficiently, and so economic efficiency would be a useful measurement stick.

Economics has an advantage compared to other social sciences, because it has a long tradition of rigid logical argumentation. If we can form an agreement between political sides that the discussion must be held within rigid logical arguments – for example if one is able to formulate the arguments mathematically – then it does not matter what the participants are feeling. If an argument presented is not a logical coherent argument, then the argument can be disregarded – not rejected but simply neglected.

If the argument is presented using the tools of economics, then opponents have to present counter arguments that are using the same strict logical traditions as in economics. If we succeed in this we will have accommodated a discussion with political opponents about important institutions within society.

Economics, with its focus on economic efficiency and rigid logical methods, can be very useful in a discussion where political emotions are present. Furthermore it leaves room for the political emotions because even if a consensus is made, that one system is more efficient, then one can still support the other system by pointing to ethical claims. To use an example, suppose that it is shown that capitalism is superior then a socialist can say that capitalism might be more efficient but it is also inherently unfair or evil. Likewise if planned economies are shown to be more efficient a supporter of capitalism can say that planning is somehow ethically inferior. In section 16 we will go through some of these arguments.

If the tools of economics are used to have a debate about a subject that invokes strong feelings, then these emotions might turn out to be very useful for the improvement of our general knowledge of our society. Instead of being an incentive to use dirty rhetorical tricks or to avoid confrontation, the political emotions can become an incentive to study important institutions with a high degree of both logics and realism. Sometimes economic theory is too unrealistic, because the assumptions are too far away from reality. If the economic science started to deal with the big political questions, instead of shying away from them, the economic science might gain a much more realistic research tradition.

3.2 Setting the bar too high or too low

Because capitalism cannot be understood in itself and a mean of comparison is needed, this presents one more difficulty. The economic alternative which capitalism is compared to has to be carefully chosen. If one chooses only to compare capitalism with economic systems that are poorly designed, then the conclusion will be that capitalism is a very well performing economic system. On the other hand, if one chooses only to compare capitalism with unrealistic paradise-like alternatives then the conclusion will be that capitalism is an inferior economic system. The challenge is to avoid setting the bar too high or too low.

The problem becomes larger because of the presence of political emotions. Proponents of capitalism will want to compare capitalism to a planned economy that is not well functioning, because this makes it much easier for them to conclude that capitalism is superior.

There is no easy way to cope with the problem of choosing the right comparison. However, if we agree that the purpose is to analyse capitalism and not to suggest any particular political reform or revolution, then we might also agree that it is better to set the bar too high than too low. By choosing a very well functioning planned economy as the means of comparison the result will be important insights into the workings of capitalism.

4 DEFINITIONS OF CAPITALISTIC AND PLANNED ECONOMIES

We have chosen to work with two clear and concise definitions of capitalism and planned economies:

Capitalistic economy: The bulk of production is organized by private enterprise.

Planned economy: The bulk of production is organized by government institutions.

This means that the discussion is centred on the institution of private property of the means of production. Because our aim in comparing the two economic systems is to get a better understanding of the world we live in, the two definitions serve two different purposes. Our portrayal of capitalism has to be an accurate and realistic depiction of the current economic system. This is especially important when we consider the implications of production being organized by private enterprise.

Meanwhile the portrayal of planned economies only has to be perceived as realistically implementable. Otherwise the discussion can never begin. Because it serves as a benchmark economy and we want to focus on capitalism the important thing is to be able to visualize a well functioning planned economy. We understand that this is hard for many, and if it is impossible to do so, we ask that you *assume* that a well functioning planned economy can exist – within some boundaries though. The planned economy we

have theorized is realistic to us. Unfortunately this is as good as it gets, we will never be able to convince everybody that a planned economy is feasible without empirical evidence. In the next two sections we hope to present a realistic portrayal of the capitalist economy and a planned economy that can be perceived as implementable.

4.1 Elaboration on the definition of capitalism

Usually the definition of capitalism comes with certain qualifiers regarding how goods are distributed or how the legal frame-work must be constructed. Milton Friedman describes what he calls ‘competitive capitalism’ as follows:

“[T]he organization of the bulk of economic activity through private enterprise operating in a free market” (Friedman, 2002, p. 4)

The definition of capitalism in the Encyclopædia Britannica also refers to a market:

“Economic system [...] in which most of the means of production are privately owned and production is guided and income distributed largely through the operation of markets.” (Encyclopædia Britannica, 2008a).

Both of these definitions mention the market, and we do not mention markets directly in our definition. This is because we consider markets to be a natural consequence of our definition. When production is organized by private agents it follows naturally that goods are distributed through exchange. Once you have a division of labour where independent agents organize production of different goods, it is natural to assume that the agents will trade their goods with each other. When we leave out markets in our definition, it is not because we find markets unimportant; on the contrary, knowledge of the market mechanism is very useful in an analysis of capitalism.

The Oxford Dictionary of English defines capitalism as:

“[A]n economic and political system in which a country’s trade and industry are controlled by private owners for profit, rather than by the state” (Oxford Dictionary of English, 2005a, p. 256)

Here there is an emphasis on the profit motive. However, like markets come naturally with private enterprise so does the profit motive. If we assume that there is free entry for new companies on markets then a profit-seeking behaviour of firms will follow. Imagine that a firm fails to act on certain profitable investments either because of

negligence or because of moral considerations, or that a firm simply fails to act in accordance with a profit motive. Then the firm runs the risk of being less competitive than other firms and thereby losing market shares, or since the firm has profits below its potential, then another firm can simply buy the firm and reap the profits. The result is that the firm, with its non-profit-seeking behaviour, would vanish from the market.

If there are some obstacles to entry in a market one can imagine that a firm can be run with other motives besides profit – but then one would have to assume that the owners do not act in accordance with their monetary self interest. In our analysis we will assume that private firms are profit motivated and that they react to no other incentives. While this might not always be true we find it close to reality.

In short, our portrayal of capitalism is an economy where production is organized by independent or atomistic, profit seeking agents operating within a market.

It is deliberate that we use the terms profit *motivated* or profit-*seeking* instead of the oft used profit-*maximizing*. We cannot say that the capitalistic firms maximize profit without making further assumptions on rationality and information. For a firm to be maximizing profits it will need a detailed knowledge of its cost function and also a detailed knowledge of the demand curve it is facing, and the ability to use this knowledge. This does not exclude the use of rational profit maximizing firms in trying to setup arguments in a discussion – but one should be careful when making these assumptions.

We have not explicitly mentioned markets in our definition of capitalism because markets are not unique to capitalism, there will quite likely also be markets in a planned economy. This is why we do not call it a market economy – markets are not exclusive to the capitalist economy and therefore it would be confusing to use the term ‘market economy’. The difference between the two economic systems is whether the firms are privately or publicly owned.

4.2 Elaboration on the definition of planned economies

While our definition of capitalism deviated only slightly from other commonly found definitions this is not the case for our definition of planned economies. The Oxford Dictionary of English defines a planned economy as:

“An economy in which production, investment, prices, and incomes are determined centrally by the government” (Oxford Dictionary of English, 2005b, p. 1346).

This definition does not mention ownership to the means of production explicitly. Instead the focus is on the control of the economy, namely that everything is decided centrally by the government. In comparison, we focus solely on the ownership to the means of production.

With our definition we make no assumption on the degree of centralization – all we say is that the production is organized by government institutions. Our definition leaves open the question of how much centralization there will be. There could be a central planning board which makes all decisions. But we could also assume a decentralized decision structure where some decisions are taken on the level of the firm and some on a more central level.

However we do not present a totally new definition. The New Palgrave Dictionary of Economics defines socialism as:

“A society may be defined as socialist if the major part of the means of production of goods and services is in some sense socially owned and operated, by state, socialized or cooperative enterprises” (Nove, 2008)

Also in his treatise on *praxeology* Ludwig von Mises explicitly distinguishes between capitalism and socialism by who has ownership rights:

“Private ownership of the means of production (market economy or capitalism) and public ownership of the means of production (socialism or communism or "planning") can be neatly distinguished” (Mises, 1998, p. 712)

These definitions are essentially the same as our definition of a planned economy, the only difference is, that we choose not to use the word socialism. For some people, the words ‘socialism’ and ‘communism’ are associated with the respective political movements where the motivations are social equality; something that we do not take into consideration. The level of inequality and poverty in a planned economy can be assumed in any way one wants.

That production is organized by government institutions does not imply a certain incentive structure. We cannot say in advance what kind of incentives will guide production and we cannot say how goods will be distributed without further assumptions.

Nor does the definition include anything about the level of democracy in a planned economy. We can imagine either a dictatorship or a representative democracy, or maybe a democracy where everything is put up for a referendum.

This means that an analysis like the one on capitalism above is not readily available for a planned economy. One thing we can say with certainty though is that a planned economy will depend on the quality of the political establishment. If governing bodies are populated with inept or corrupt bureaucrats the result would of course be an ineffective, poorly-managed economy. The ineptness of the political elite will in turn depend on how they are elected and which incentives they face. If we are dealing with a one party system or a dictatorship it is highly unlikely that their decisions will serve the public good. If we have a democracy with a biased media, voters might not get the information that they need to ensure a certain quality of their politicians. These kinds of considerations can follow from our definition of a planned economy. Further specific assumptions are needed to have a more in depth discussion of the consequences of a planned economy.

5 EMPIRICAL ANALYSES OF CAPITALISM AND PLANNING

There are a couple of possible options for introducing empirics into the debate on capitalism and planning.

5.1.1 The Soviet Union

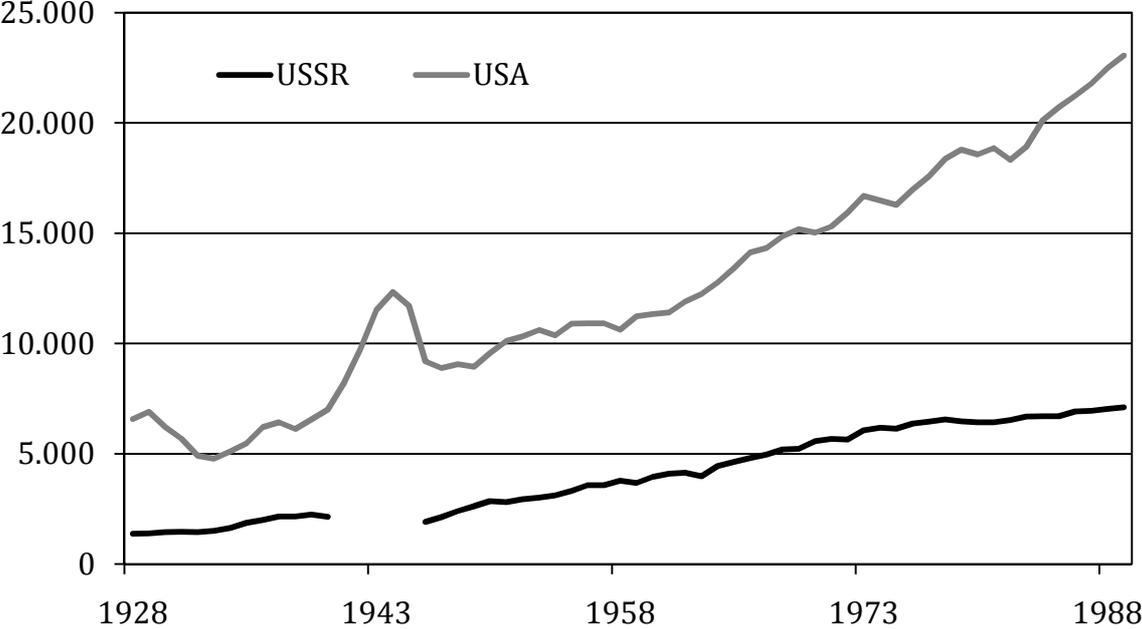
Today when empirics are introduced in the debate on capitalism and planning it is by way of referring to the fall of the Soviet Union. To claim that the fall of the Soviet Union shows that a planned economy can never work or that history shows that capitalism is superior to planning, is a very effective way of arguing. The main reason why the debate has been dead for the last two decades might very well be the collapse of realised socialism.

However, to introduce the fall of Soviet planning as evidence of the superiority of capitalism is to assume implicitly, that there is no other alternative to modern capitalism but totalitarian central planning.

It is also unfortunate if the crimes of past dictatorships should have the consequence that we stop analysing the institutions of our society – in this case private property rights to the means of production. With these comments in mind it might still be interesting to see what conclusions we can make when we compare the economic accomplishments of Soviet planning with western capitalism.

Figure 1 shows the per capita GDP in USA and USSR. From this we can see that the capitalistic United States has been a much richer country than the USSR throughout the twentieth century. This shows that certain traits within the US economy has been more beneficiary to economic development than in the USSR – however since the US was also much richer than the USSR before the Bolshevik revolution we cannot be sure whether capitalism or planning had anything to with this.

Figure 1. Real GDP per capita in USA and USSR, 1928-1989



Note: 1990 International Geary-Khamis dollars.

Source: Maddison (2007).

Instead of comparing the level of GDP per capita, we can compare the growth rate in GDP per capita.

Table 1. Average growth in GDP per capita - 1947-1989

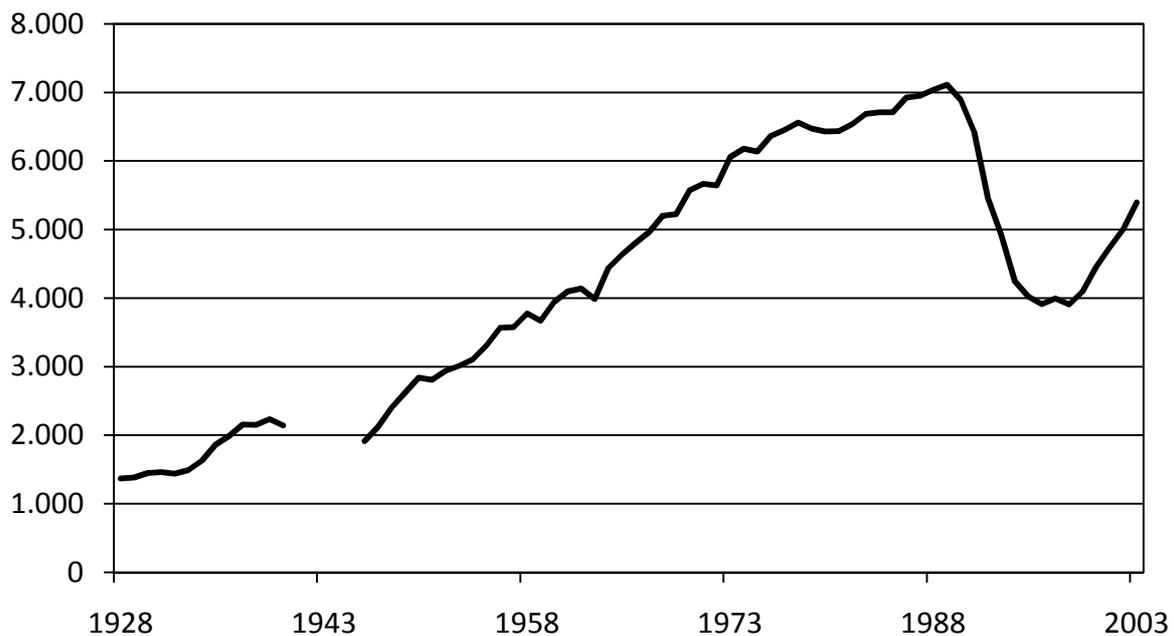
	Average growth in GDP per capita	Standard deviation
United States of America	2,2	3,9
Soviet Union (USSR)	3,2	2,7

Source: Maddison (2007).

Table 1 shows the average growth in the period after the Second World War. In this period the average growth rate was 3.2 percent in the USSR and 2.2 percent for the US – so the growth in capitalist USA was one percentage point lower than the growth in the Soviet Union. By applying a statistical analysis of variances on the data in Maddison (2007) we can compare the average growth of the two countries. The result is that the difference is not statistically significant this means that the growth in USSR was not significantly larger than the growth in USA, so we cannot use the result in Table 1 to conclude that planning is superior to capitalism. This conclusion can also be reached by noticing the high standard deviations in Table 1. Even if we had found that economic growth in the USSR was significantly higher than the growth in USA, we would not be able to say whether this was had anything to do with capitalism or planning. The fact that USSR grew faster in the after-war period could very well be explained by catch-up growth – the theory that, all else being equal, a country with a lower level of per capita GDP will grow faster than a country with a higher level (Sørensen & Whitta-Jacobsen, 2005).

Another way of using empirical analysis to compare capitalism and planning is to look at the economic development in the USSR while it was a planned economy and while it was capitalistic. To compare the economic growth in the former USSR when it was a planned economy and as a capitalistic economy should make it easier to isolate the effect of planning. Figure 2 shows GDP per capita in the USSR while it was a planned economy and while it was capitalistic. From 1990 to 1998 there is a large fall in the wealth of the former USSR. And even though there has been relatively high economic growth since 1998, the level of GDP per capita in 2003 was well below the level in 1989.

Figure 2. GDP per capita in former USSR - 1928-2003



Note: 1990 International Geary-Khamis dollars.

Source: Maddison (2007).

The Soviet Union ceased to exist in 1991 (Encyclopædia Britannica, 2008b), and if we assume that the subsequent countries are capitalistic after 1991 then we can conclude that the introduction of capitalism had an adverse effect on economic growth – all else being equal. By comparing the growth rates in the two periods we find a significantly lower growth in the period from 1991 to 2003. However, if one considers the period from 1991 to 1998 as a period of transition – i.e. neither capitalistic nor planned economy – then we cannot make this conclusion.

The investigation of the data on the Soviet Union could be greatly expanded, however it is not obvious whether this would lead to any reliable conclusions regarding capitalism and planning. Even if one could come to the conclusion, that the data proved that capitalism had historically been superior to planned economies, it would still be impossible to distinguish the effects of planning from the effects of totalitarianism – since the Soviet Union and its allies were all more or less totalitarian (Roemer, 1994).

5.1.2 *Politics and empirics*

The short analysis above shows how difficult it is to verify claims with the help of empirics. Even if we find a statistically significant difference between capitalistic and

planned economies we cannot know whether this difference corresponds to causality or whether we have simply stumbled upon a spurious difference.

To ensure that correlation equals causality one would have to present an analysis using advanced econometrics, and even with this we cannot be sure about the results. There is always the possibility that an econometric analysis can be changed ever so slightly, and then have the opposite result. In order to believe in the result that are produced by using advanced empirical analysis one needs a certain amount of faith. This makes it easy for political opponents to dismiss the analysis. The same problem can be illustrated with the word trust – to believe in the results of an advanced econometric analysis, one has to trust that the econometrician has conducted the analysis with intellectual honesty. Trust is difficult to muster in an emotionally laden political discourse. In order to form an agreement, that certain empirical results actually reveals meaningful insights on capitalism or planning, both sides have to agree on how the analysis should be conducted. Since no side has the incentive to agree on a framework which causes an unfavourable conclusion, we can imagine that it will be hard to form an agreement.

Because of these problems with empirical analysis, we have concentrated on presenting theoretical arguments in the debate on capitalism and planning. Theoretical arguments based on economic theory are logical deductions where arguments and counter-arguments present advances, in the discussion, and in the understanding of the issue which is debated.

5.1.3 Empirical falsification

While it is difficult to use an empirical analysis to determine which is superior, capitalism or planning, we can use realised planned economies to falsify certain statements.

However, even to do this there has to be an agreement on which economic institutions that can be regarded as planned economies. As Coase (1937) highlights, the firm is an island of planning in the midst of an ocean of market transactions. This means that we can analyse how things are being done in a private firm and thereby falsify certain statements concerning the possibilities within a government firm. All current government institutions are also available as examples of how one could organize production in a planned economy. It is very hard to use these examples to form any

positive statement about the how well a planned economy would be compared to a capitalistic – but they can be used to falsify practical questions. For example if one could ever make good decisions concerning what to produce or how, the first thing we would do is to look at how it is done in a private firm or in government institutions. If the procedure of a current private or government firm can be mimicked then decisions concerning what to produce and how can be at least as good in planned economy.

PART TWO

REVIEW OF THE LITTERATURE

As already mentioned, the question we want to address is how economics can contribute to the understanding of capitalism. Above we argued that economics can contribute with its rigid logical approach and the focus on economic efficiency.

This part of our thesis will explore how economics *has* contributed to the understanding of capitalism. The review of the historic debate which we present is intended for a reader who is not familiar with the literature on capitalism and planning. We will present the most important contributions with a focus on the arguments and their scientific validity. This focus will enable us to understand both what has been said but also what one can conclude on the merits of both capitalism and planning. By evaluating the validity of arguments instead of just presenting them we risk being seen as partisan – we will make the effort nevertheless and must point out, that we have attempted to provide a non-partisan review. In addition to providing familiarity with the literature on capitalism and planning, we also want to identify and address the arguments in the debate which can be seen as debate-stoppers. This is arguments which, if true, in their character are so severe that any further debate is futile.

The contributions we cover lie within the territory of economics. We however also consider some important non-economic contributions. The economic contributions we have chosen to cover are the Marxist critique, the ‘calculation debate’ and some newer contributions – where the calculation debate is the biggest and most important contribution from economics.

The economic science is not at the centre of the debate, which is why we also cover some non-economic arguments. The authors of the contributions that we cover are all highly regarded economists such as Milton Friedman and Friedrich von Hayek – both Nobel-prize winning economists – and Karl Marx who is one of the fathers of the economic science. A review without the contributions of these icons would be incomplete since their arguments are so often referred to in a discussion of capitalism and planning.

In the end the reader will have a thorough understanding of the most important arguments in the debate of capitalism and planning and it will be possible to compare our contributions to the debate with the historic contributions.

6 MARX: THE CAPITAL

Karl Marx published the first volume of 'The Capital' in 1867 in which Marx argues that the profits a capitalist earns comes from the exploitation of workers. This is the theory of surplus value. To understand the theory one must first understand the labour theory of value which Adam Smith and David Ricardo are famous proponents of.

6.1 The labour theory of value

The aim of the labour theory of value is to help us understand what determines the relative prices of exchangeable goods, or what determines the relative value of goods. Adam Smith, writing in 1776, argued that utility or 'value in use' cannot be of importance in the determination of prices:

“Nothing is more useful than water: but it will purchase scarce any thing; scarce any thing can be had in exchange for it. A diamond, on the contrary, has scarce any value in use; but a very great quantity of other goods may frequently be had in exchange for it” (A. Smith, 1998, pp. 34-35)

This is known as the water-diamond paradox and the problem convinced the leading classical economists to disregard the role of consumer demand in determining prices. Instead they focused on labour:

“Labour was the first price, the original purchase-money that was paid for all things. It was not by gold or by silver, but by labour, that all the wealth of the world was originally purchased; and the value, to those who possess it and who want to exchange it for some new productions, is precisely equal to the quantity of labour which it can enable them to purchase or command” (A. Smith, 1998, p. 36)

The point is that labour is universal to all goods – all exchangeable goods have been brought to the market with the help of human labour. This is true for all goods including

raw materials. The value of a product is the quantity of labour that was used in bringing it to the market, including the labour it took to bring forth the raw materials. Labour thereby reflects the cost of producing a good and hence determines the value of the good. The next step is to say that exchange between two goods reflects the relative amounts of labour:

“If among a nation of hunters, for example, it usually costs twice the labour to kill a beaver which it does to kill a deer, one beaver should naturally exchange for or be worth two deer.” (A. Smith, 1998, p. 45)

Because the labour employed in killing a beaver and bringing it to the market could have been used to kill two deer, the natural exchange price becomes one beaver for two deer. The point is that the exchange of two goods is the exchange of equivalent amounts of labour. Because labour is universal in production it has the property of being both a cost and an opportunity cost at the same time. The price a person is willing to pay for a good on a market is determined by the amount of labour she should otherwise have used to produce the same good herself. To use the terms of modern economics; labour determines a consumer’s willingness-to-pay as well as the producer’s costs.

Marx notes that the labour theory of value does not imply that one should simply count the hours used by a person to make a certain good. This would mean that a product was more valuable the more lazy and inept the manufacturer was – because she would use more time in the production. But this is not the case; instead the value of a product is determined by the amount of socially necessary labour time embodied in a good, which Marx defines as follows:

“The labour-time socially necessary is that required to produce an article under the normal conditions of production, and with the average degree of skill and intensity prevalent at the time.” (Marx, 1970, p. 133)¹

The value of a product is then determined by the average labour needed at any given point in time. This means that the relative price of a good changes when for example an invention lowers the average time needed to produce it.

¹ All page references refer to the Danish translation of Marx’s *Das Kapital* (Marx, 1970). All English translations are taken from Marx (1999).

6.2 Labour as a commodity

The addition made by Marx to the labour theory of value is the idea that labour itself is also a commodity:

“[T]he labourer instead of being in the position to sell commodities in which his labour is incorporated, must be obliged to offer for sale as a commodity that very labour-power, which exists only in his living self.”
(Marx, 1970, p. 284)

This is a description of the proletariat that has no ownership of any means of production and therefore has to sell labour in order to survive. Since labour itself is a commodity which is sold and bought Marx asserts that the price of labour must follow the labour theory of value:

“The value of labour-power is determined, as in the case of every other commodity, by the labour-time necessary for the production, and consequently also the reproduction, of this special article. So far as it has value, it represents no more than a definite quantity of the average labour of society incorporated in it.” (Marx, 1970, p. 284)

Labour-power, the commodity being sold, is the physical and mental abilities of a human being. The price of labour-power is determined by the amount of labour-time necessary for the worker’s production and reproduction. This means that the price of the food and clothes and other commodities needed by a worker and her family in turn determines the price a worker will take for her labour-power. This price of labour-power can change if prices of food changes or if the general standard of living rises. This means that the price of labour-power also has a social element . The social standard of living includes housing or in our time a television then this is included in the wages:

“[The worker’s] so-called necessary wants, as also the modes of satisfying them, are themselves the product of historical development, and depend therefore to a great extent on the degree of civilisation of a country, more particularly on the conditions under which, and consequently on the habits and degree of comfort in which, the class of free labourers has been formed” (Marx, 1970, p. 287)

It is informative to notice that the labour theory of value solves the water-diamond paradox. A diamond is expensive because it requires much labour-time to extract it from the earth. Whereas water is much easier to come by and therefore water is cheaper than diamonds.

6.3 Surplus value

By using the labour theory of value we have the theoretical price for all factors that are used in capitalist production. The question is how a capitalist earns a profit. If a person buys a commodity and sells it to someone else this cannot generate a profit since the labour-time endowed in the commodity does not change. The commodity is bought and sold at the same price. So how is it that a capitalist can buy raw materials, machines and labour and earn a profit?

All raw materials are bought and sold at the same price. The machines contribute with a value corresponding to its depreciation. So if a machine costs one thousand dollar and in during its service life can produce one thousand products then it contributes one dollar worth of value to each product. By the logic of the labour theory of value neither production capital nor raw materials can generate the capitalist's profits. But this is not the case for labour:

“[T]he past labour that is embodied in the labour-power, and the living labour that it can call into action; the daily cost of maintaining it, and its daily expenditure in work, are two totally different things. The former determines the exchange-value of the labour-power, the latter is its use-value. The fact that half a day's labour is necessary to keep the labourer alive during 24 hours, does not in any way prevent him from working a whole day. Therefore, the value of labour-power, and the value which that labour-power creates in the labour-process, are two entirely different magnitudes; and this difference of the two values was what the capitalist had in view, when he was purchasing the labour-power.”(Marx, 1970, pp. 321-322)

The value of labour-power (the wage) is less than the value that the labourer creates. The wage is determined by the labour-time endowed in all the goods that is needed to keep the worker and her family with food and cloth etc. If the combined labour-time of

all of these goods is less than a full work day then it is possible to make a profit by hiring labour.

Marx gives an example where the combined labour-time needed to make the products that are necessary for the daily reproduction of the worker corresponds to a half work day – four hours in Marx’s example. Then this would be the price of labour-power. However the price was not for four hours of work the price is for a full day’s work. The fact that only four hours of work are needed to keep the worker and her family alive has no effect on how many hours the human body can work. It is simply two different things.

This is how the capitalist can earn a profit; the price of labour-power is less than the value it produces. Remember that the worker creates value by working – since (socially necessary) labour-time is what determines value. So by working a full day she adds the value of a full day – but is only paid half. This is the theory of surplus value and it follows from the logics of the labour theory of value.

The exploitation of one class by another is not a new thing in world history, says Marx. The slaves were exploited by the slave owners and the serfs by the landowners just as the capitalists are exploiting the workers in capitalism:

“Capital has not invented surplus-labour. Wherever a part of society possesses the monopoly of the means of production, the labourer, free or not free, must add to the working-time necessary for his own maintenance an extra working-time in order to produce the means of subsistence for the owners of the means of production” (Marx, 1970, p. 327)

6.4 The tendency of the profit rate to fall

Competition between capitalists will force capitalists to produce as cheap as their competitors which mean that a capitalist has to invest in labour-saving machines. However, since labour is the only source of profit this will slowly lead to a fall in the general rate of profit. This will, according to Marx, cause recurrent crises within the capitalist economy.

6.5 Critique of the labour theory of value

The surplus theory as well as the profit rates' tendency to fall, which constitutes Karl Marx's critique of capitalism, stands and falls with the labour theory of value. This theory can be countered by simply pointing to a lack of information. In a trade situation where a buyer and a seller need to find a price they will never be able to know the amount of socially necessary labour-time endowed in the products.

If neither of the participants bargaining knows the correct price according to the labour theory of value, how can we say that they will agree on this particular price – even on average? The lack of information makes it improbable for actual prices to correspond to the theory.

Mark Blaug points out that the labour theory of value implies that labour intensive industries will be the most profitable – and the very opposite is true (Blaug, 1996, p. 239).

The introduction of a marginal approach to economics introduced an alternative to the labour theory of value which could also explain the diamond-water paradox. The marginalists' approach defines prices as determined by consumers' marginal utility and producers' marginal costs (Blaug, 1996, pp. 277-310). The reason water is cheaper than a diamond is not because water is overall less useful but because the marginal utility of one more litre of water is smaller when water is abundant. Diamonds are rarely abundant and thus have a larger marginal utility.

The marginal approach provides a theory where prices are determined by supply and demand, which is realistic. Furthermore the marginal approach provides us with a theory of what determines supply and demand – namely marginal utility and marginal cost. The labour theory of value is both falsified and replaced by a better theory. This means that the theory of surplus value no longer has a scientific grounding.

Proponents of socialism can still point to the theory of surplus value and argue that capitalists have no right to their profit. The argument, however, is no longer scientific but merely an ethical assertion. The gist of their argument is that any value created will ultimately be derived from labour. The machinery owned by a capitalist is produced by labour; and without labour, capital will produce nothing. Socialists can claim that capitalists do not add value to the production and that the production of society can

continue without them. Note that the worker's claim on the capitalist's profits is based on an asserted right to the value of their labour and is thus built on ethical considerations rather than upon the economic science.

7 INTRODUCTION TO THE CALCULATION DEBATE

In a broad-sweep statement it can be said that the calculation debate consisted of two economic paradigms – the neoclassical socialists and the Austrian laissez-faire free-marketers – talking past one another throughout the 1920s to 1940s (Vaughn, 1980). Yet in the end the debate has become one of the most important theoretical controversies in the field of comparative economics (Lavoie, 1985).

While the socialists built their line of reasoning on the mainstream economic thought of the day the heterodox Austrian school of thought had numerous important critiques of both planning but also at the underlying assumptions in the neoclassical models.

This section will investigate the arguments used in the calculation debate and extract important insights necessary for a better understanding of capitalism but also for assessing the feasibility of using planning as a benchmark economy.

First a short historical overview of the calculation debate is presented; this is mainly to emphasize the temporal ordering of different contributors to the debate. Then the major contributions to the calculation debate will be covered.

7.1 A brief introduction to the major participants of the calculation debate

The participants in the calculation debate represent two distinct schools of economic thought: the Austrian and the neoclassical schools of thought. The following few paragraphs will introduce the major participants in the order they published. We have deemed this short introduction necessary since much of the material we have relied on for our research is reprints of the original contributions. In this sense it may be difficult to see in what order the individual contributors wrote, and therefore difficult to see which participant of the debate a given contribution is aimed at.

Even where the debate starts is somewhat unclear. Some scholars argue that the calculation debate started with Marx' contribution (Lavoie, 1985). We consider the contribution by Ludwig von Mises as the opening shot in the calculation debate.

Mises published “Economic Calculation in the Socialist Commonwealth” in 1922 as a response to the socialist movement at the time. Mises argued that his later contribution on “Human Action: A Treatise on Economics” essentially represents the same arguments as the 1922 contribution. We therefore, for simplicity, consider Mises’ two contributions as one argument.

As a response to Mises, Oscar Lange and others replied with the various schemes of Market Socialism.

In response to Lange, Friedrich August von Hayek then contributed the Austrian knowledge-argument. While Hayek’s contribution was a response to the market socialists it still incorporated many of Mises’ original arguments. Many of Hayek’s points were left unchallenged and we therefore end the calculation debate with an exposition of what constitute the Austrian knowledge argument.

The importance and consequences of the calculation debate can only be made clear after the debate is understood. We have therefore chosen to wait until all contributions are presented to criticize individual components of the debate.

8 LUDWIG VON MISES: ECONOMIC CALCULATION IN THE SOCIALIST COMMONWEALTH

Ludwig von Mises’ argues that a socialistic economy will be unable to conduct rational economic planning. Mises’ reasoning is based on three assumptions.

Firstly, it is assumed that all means of production are owned by the community and that these are allocated by a special body; a planning authority (Mises, 1990).

Secondly, it is assumed that in a socialistic society distribution of consumption goods must be independent of production. This means that the wages allocated to a given person will be independent of her productivity. The actual means of distribution is irrelevant but Mises first assumes that individuals are given coupons against which consumption goods can be claimed (Mises, 1990).

Thirdly, it is assumed that the planning authority will adjust supply of individual consumption goods to match demand (Mises, 1990).

Based on these three assumptions Mises argues that economic calculation in a planned economy is impossible. In essence the argument is as follows: in a planned economy production goods are never traded and if the planned economy gives up on “*freely established monetary price[s] for goods of a higher order [production goods], rational production becomes completely impossible*” (Mises, 1990, p. 13).

Thus, according to Mises, monetary prices are necessary for economic calculation and even more so for the existence of an economy:

“Hence in a socialist state wherein the pursuit of economic calculation is impossible, there can be [...] no economy whatsoever.” (Mises, 1990, p. 14).

These statements indeed seem damaging for the prospects of planned economies and it is worth investigating the topic further.

8.1 Economic calculation and the importance of market prices

Mises sees prices as the cornerstone of economic calculation and claims that without prices, rational economic calculation – and thereby rational planning of production - simply is impossible. It is central to the argument that the prices in question actually are the prices on production goods.

Mises argues that even in his version of a planned economy some kind of market prices will arise on consumption goods. This follows from an assumption on how goods are distributed: agents are given coupons against which they can claim specified consumption goods. Through informal barter trading of these coupons relative valuations of the consumption goods arise.

Mises takes this to the logical extreme and points out that *money* – rather than the aforementioned coupons – will be the medium of exchange in a socialist economy but Mises argues that the role of money will be inherently different between capitalistic and planned economies. In a planned economy the role of money will be reduced to only serve as a medium of exchange for consumption goods. Conversely, since inputs to production in a planned economy are allocated rather than traded:

“[N]o production good will ever become the object of exchange, [and] it will be impossible to determine its monetary value” (Mises, 1990, p. 6).

For Mises it is crucial that prices are formed under the exchange of goods.

To understand this proposition we must understand how Mises views prices. Prices in themselves measure relative worth between different goods – this is the general definition – the important point is how prices are generated. Mises does not consider marginal utility as a basis for obtaining correct prices, because:

“[M]arginal utility does not posit any unit of value” (Mises, 1990, p. 8).

For the individual agent, the value judgement does not imply a price but only the ordering of different goods:

“A value judgment never consists in anything other than preferring a to b” (Mises, 1998, p. 332)

Marginal utility is merely a subjective value whereas prices must be a reflection of the objective value. The objective value must instead arise from the behaviour of agents:

“[I]n an exchange economy the objective exchange value of commodities enters as the unit of economic calculation” (Mises, 1990, p. 9).

Thus through exchanges the subjective value of different agents are amalgamated to form a common objective exchange value.

Thus far Mises’ argument suggests that through barter trading an objective valuation of different goods can arise, however this valuation is still ‘only’ a relative price. Mises argues, that:

“[S]ince goods are mutually substitutable in accordance with the exchange relations obtaining in the market, any possible good can be chosen. In a monetary economy it is money that is so chosen.” (Mises, 1990, p. 9).

To sum up Mises’ argument: Through the actions of exchange, people establish a relative price amongst themselves and for computational ease they choose to measure this price in money, therefore:

“Economic calculation always deals with prices, never with values” (Mises, 1998, p. 332).

8.1.1 *Economic calculation in the socialist state*

Mises sees economic planning without prices as feasible only when the economy is *very* small; for instance within the confines of a single household. This process is unable to scale and Mises thus argues that:

“It is an illusion to imagine that in a socialist state calculation *in natura* can take the place of monetary calculation” (Mises, 1990, p. 13).

This argument is further refined to say that *in natura* calculation can encompass consumption goods only and that without prices economic calculation “*fails completely*” when dealing with production goods (Mises, 1990). To see why Mises holds this belief is somewhat straightforward; Mises offers a parable on his view of production in the socialist commonwealth:

“One may anticipate the nature of the future socialist society. There will be hundreds and thousands of factories in operation. Very few of these will be producing wares ready for use; in the majority of cases what will be manufactured will be unfinished goods and production goods. All these concerns will be interrelated. Every good will go through a whole series of stages before it is ready for use. In the ceaseless toil and moil of this process, however, the administration will be without any means of testing their bearings. It will never be able to determine whether a given good has not been kept for a superfluous length of time in the necessary processes of production, or whether work and material have not been wasted in its completion. How will it be able to decide whether this or that method of production is the more profitable?” (Mises, 1990, p. 14).

This is the core of Mises’ argument against socialism and for capitalism; it is unimaginable that rational economic production can be conducted when the planning authority has no means of valuating any intermediate step but only know the value of the finished consumption good. It is, to Mises, a prerequisite for conducting rational economic planning that information regarding the profitability of different choices is easily and readily available:

“Where there are no money prices, there are no such things as economic quantities. There are only various quantitative relations between various

causes and effects in the external world. There is no means for man to find out what kind of action would best serve his endeavors to remove uneasiness as far as possible” (Mises, 1998, p. 210).

This is where monetary calculation comes in to play. When everything has a price, calculations regarding profitability are much simplified. Agents must calculate expected expenses and profits for the different production plans under consideration. By comparing these it is immediately obvious which production-plan provides the highest payoff and therefore is the best.

Mises argues that since prices on production goods are absent in the socialist state, knowing the demand for goods is insufficient for planning production. Knowing the demand solves only half of the problem. The state will still be incapable of valuating the means of production:

“Thus 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.” (Mises, 1990, p. 17).

But why does Mises reject the notion of prices on production goods in a planned economy? Mises argues that it is not prices *per se* that are important but rather it is prices arising through human interaction that are necessary. For Mises it is central that individual agents have private ownership to the means of production and it is from the trading of goods or services that they possess that the correct prices arise. Prices formed through any other means than market interaction will be inadequate for economic calculation (Mises, 1998). Economic calculation can only be based on market prices:

“Economic calculation in terms of money prices is the calculation of entrepreneurs producing for the consumers of a market society. It is of no avail for other tasks.” (Mises, 1998, p. 217)

Thus Mises rejects the use of economic calculation in other societal arrangements; prices formed by any other mean than by the market process will be arbitrary and hence “*do no not refer to reality*” (Mises, 1998, p. 217).

With this damaging critique of centralized planning in mind it seems necessary to understand how Mises explains price formation in a market economy to assess the merits of the argument.

8.2 Price Formation in the Misesian World

As previously stated Mises discarded individual subjective value as a way of directly ascertaining the value of a given good. Instead an objective value will have to arise from market exchanges. This section will deal more closely with how Mises argues that monetary prices are formed on the basis of such exchanges.

To accurately describe market interactions Mises rejects the word *economics* but instead refers to *catallactics* and defines this as:

“[T]he field of catallactics or of economics in the narrower sense is the analysis of the market phenomena. This is tantamount to the statement: Catallactics is the analysis of those actions which are conducted on the basis of monetary calculation. Market exchange and monetary calculation are inseparably linked together” (Mises, 1998, p. 235).

This should be seen in conjunction with Mises’ argument that economics and catallactics are both sub-fields within the scientific realm of *praxeology* – a general theory of human action (Mises, 1998, p. 3).

Thus price formation in this catallactic view is the study of how prices arise from agents interacting in a market. The market process is necessarily grounded in private property rights and prices are formed by continual goods-exchanges until no further exchanges are deemed worthwhile:

“People keep on exchanging on the market until no further exchange is possible because no party expects any further improvement of its own conditions from a new act of exchange. The potential buyers consider the prices asked by the potential sellers unsatisfactory, and vice versa” (Mises, 1998, p. 245).

The market process is a highly dynamic process and the state that the market is in at any given time reveals the price structure:

“The state of the market at any instant is the price structure, i.e., the totality of the exchange ratios as established by the interaction of those eager to buy and those eager to sell” (Mises, 1998, p. 259).

The exchange ratios established are essentially derived from barter trading, but the prices are a mere snapshot of the trades that agents were willing to make. Mises argues that prices do not represent any true exchange ratio amongst goods but rather that prices arise from a discrepancy in valuation. Agents trade only when one values a good higher than the other.

8.2.1 *Appraising future prices*

For Mises, money prices are but a historical fact and therefore, while future prices may well equal past prices, this will be due to a coincidental combination of factors giving rise to the same price. Mises therefore distinguishes between *appraisal* and *valuation*. Appraisal is an effort towards establishing future prices:

“Appraisal is the anticipation of an expected fact. It aims at establishing what prices will be paid on the market for a particular commodity or what amount of money will be required for the purchase of a definite commodity” (Mises, 1998, p. 329).

The appraisal of prices is particularly important for establishing prices on production goods. Mises argues that prices on production goods are formed by entrepreneurs’ bidding for the production good based on their appraisal of prices:

“[T]he prices of the factors of production are determined exclusively by the anticipation of future prices of the products” (Mises, 1998, p. 334).

It is noteworthy that Mises’ argument on price formation on production goods closely resemble Hayek’s argument of “*knowledge of time and place*” (Hayek, 1945) – an argument we will return to in section 10. Mises thus argues that prices on production goods are formed by entrepreneurs who are simply better than average at appraising future prices; in Mises’ own words:

“The mentality of the promoters, speculators, and entrepreneurs is not different from that of their fellow men. They are merely superior to the masses in mental power and energy. They are the leaders on the way

toward material progress. They are the first to understand that there is a discrepancy between what is done and what could be done. They guess what the consumers would like to have and are intent upon providing them with these things. In the pursuit of such plans they bid higher prices for some factors of production and lower the prices of other factors of production by restricting their demand for them” (Mises, 1998, p. 333).

The entrepreneurs base their appraisal of future consumer demand on observations of the past. The entrepreneurs use their specific knowledge of how the prices were realized in the past to produce qualified guesses as to how they will most likely be in the future. Based on these guesses the entrepreneurs then adjust their demand for production goods and set prices based on these.

Thus for Mises prices on both consumption and production goods are something that can arise from the competitive market only; they “*are a market phenomenon*” (Mises, 1998, p. 392) and any attempt to construct or declare prices will simply lead to “*prices that are wholly and inescapably arbitrary*” (Salerno, 1990, p. 40).

8.3 Summary of Mises’ calculation argument

Mises’ argument goes to the core of the debate between capitalism and socialism: the ownership to the means of production. Mises argues that there is a direct causality between economic efficiency and private property rights. The prices created through the rivalry of capitalistic entrepreneurs in a market interaction, reveal economic information concerning the subjective valuation of independent agents. Without private property rights the prices will be arbitrary and economic calculation impossible. The price signals in a planned economy will not reflect relative scarcity and relative abundance, and this means that no one will know whether resources are used optimally.

Following Mises, a manager in a planned economy that chooses between different ways of producing some good, has no way of possibly ascertaining whether she has chosen the most efficient production process – because prices on intermediate goods are not a product of catallactics. Hence rational economic calculation is impossible. Now if the Misesian view on prices and economic calculation are wholly accepted as being correct then plain simply the idea of using a planned economy as the set benchmark is a non-

starter. We return to Mises' argument after the other contributions to the calculation debate. The next section turns to Oscar Lange's contribution to the calculation debate

9 OSCAR LANGE'S MARKET SOCIALISM: A REPLY TO MISES

Oscar Lange published an article in 1936 in which he argued that economic calculation is possible in a socialist economy and that the reason Mises thinks otherwise is because he has misunderstood the nature of prices (Lange, 1994). Lange turns to a definition of prices offered by British economist Phillip Wicksteed where the term 'price' has two meanings:

1. Ordinary meaning: Exchange ratio of two goods as observed in a market.
2. Generalized meaning: Terms on which alternatives are offered to us.

The difference between the two is whether or not the price is observed in a market. So because there is no market for capital goods in a planned economy there will not be prices in the ordinary meaning – just as Mises points out. However, Lange argues, one can actually observe prices in the generalized meaning and use these to perform economic calculation, and this is what Mises fails to notice. To see that prices defined as the 'terms on which alternatives are offered' can be observed without a market, Lange sets up a framework to understand the producer's choice between alternatives:

"To solve the problem three data are needed: (1) a preference scale which guides the activity of choice, (2) knowledge of the "terms on which alternatives are offered", and finally, (3) knowledge of the amount of resources available. Those three data given, the problem of choice is soluble." (Lange, 1994, p. 253)

The first requirement – the preference scale – is given by the demand schedules of individuals i.e. a demand function. While the third requirement, resources available, would be given by knowledge of available supply and stock holdings. These two sets of data are available in a socialist economy, according to Lange. The last set of data needed is prices (in the generalized meaning) and Lange argues that these are also available:

"[A] careful study of price theory and of the theory of production convinces us that, the data under (1) and under (3) being given, the

“terms on which alternatives are given” are determined ultimately by the technical possibilities of transformation of one commodity into another, i.e. by the production functions. The administrators of a socialist economy will have exactly the same knowledge, or lack of knowledge, of the production functions as the capitalist entrepreneurs have.” (Lange, 1994, p. 254)

If a planner can rank different production schedules given by demand and know the amount of resources available then knowledge of the production function will give the information needed concerning prices and hence make economic calculation possible. So even though there is no market for capital goods, a planner can use knowledge of the efficiency of different substitutable capital goods to calculate the most efficient production schedule.

9.1 Prices in a capitalistic market

With the argument made against Mises, that economic calculation is theoretically possible when there is communal ownership of production capital, Lange continues to describe how calculation could work in practice.

The first step is to understand how prices come about in a competitive capitalistic market. Lange argues that, the competitive market can be described by a Walrasian style general equilibrium model, where agents are price taking and seek to maximize utility and profits respectively. Prices are then made in the market through a series of trials and errors –or tâtonnements – until equilibrium is found on all markets – where equilibrium means that demand equals supply. We could start out with a random set of prices and then wherever one finds a market with supply exceeding demand, a lower price would be the result and vice versa. This gives us a new set of prices and with these in effect we again observe if there are markets with excess supply or demand. The process of trial and error continues on the market until equilibrium is reached.

This is how Lange understands prices in a capitalistic economy and from here he goes on to describe how a central planner can use a similar method.

9.2 Prices in market socialism

Lange assumes that managers in a planned economy are given two rules to guide their decisions:

1. Minimize average production cost.
2. Produce as much as can be sold to consumers, or accounted for in other industries, at a price equal to average cost.

The first rule replaces the profit motive of the private firm while the second rule replaces the competitive pressure from free entry of firms in a capitalist economy.

Prices are set by a central planning board and all managers are therefore price-takers. If there is excess supply or excess demand of a product the planning board changes prices through trial-and-error, much like the model of the market described above. Because the process of making production decisions and the price mechanism are so similar Lange argues that the prices are not any more or less arbitrary than in the capitalist market, and hence he argues that economic calculation is also practically possible in a socialist economy.

9.3 Critique of Oscar Lange

The theoretical argument that Lange offers in response to Mises is based on the definition of prices offered by Wicksteed. Whether or not Mises has misunderstood the nature of prices is not important Hoff (1949) for instance denies that Mises had misunderstood prices. The important thing to note is that Lange makes his theoretical argument by referring to Wicksteed as if he is an authority. This does not constitute a compelling argument on what prices are

Lange's practical argument, however, is a better approach to the Misesian claim. To disprove Mises, one has to understand how prices are formed in a capitalistic market and show that a planned economy can mimic this process. This is what Lange does by going through the Walrasian general equilibrium model. Using the same logic as Walras, Lange illustrates that a planner should be just as able to establish the correct prices. Lange merely replaces the Walrasian auctioneer with the Central planner thus resulting in the same level of efficiency.

The problem is whether the Walrasian model gives an accurate description of price formation in a capitalistic market, and we will discuss this in section 11. The next section turns to Friedrich August von Hayek's response to Lange's model of market socialism.

10 HAYEK: KNOWLEDGE, KNOW-HOW AND ECONOMICS

Hayek acknowledges that planning is indeed *theoretically*² possible but instead contends that any real world implementation of the proposed schemes is infeasible.

The next sections will explore Hayek's argument of time and place – later termed economic know-how by Greenwood (2007) – and how this can affect an understanding of both capitalism and the benchmark economy.

First we address Hayek's notion of knowledge and what it means for the concept of general equilibrium and its effect on planning will be investigated.

Second, we turn attention to Hayek's review of, and response to, the proposed model for market socialism. This contribution is split in two. Hayek's arguments on market socialism can be seen partly as in line with the calculation debate and partly as a critique of the feasibility of market socialism. The part that is in line with the calculation debate is treated in this section whereas the remainder is covered after the calculation debate.

Third, we consider Hayek's full-blown argument on how a market society uses knowledge, and how the market structure can transmit such knowledge absent of any formal mechanisms for doing so, will tie the argument on knowledge together.

Lastly, this section will discuss the implications of the "Austrian" equilibrium concept and economic know-how for a decentralized planned economy.

10.1 Equilibriums in a dynamic market

Given the very dynamic nature of everyday life, it is puzzling that many economic models are using a framework for analysis which, at its core, is the analysis of how an out-of-balance economy works its way back towards equilibrium. This is exactly what Hayek is concerned with at the outset as he turns attention to:

"[T]he rôle which assumptions and propositions about the knowledge possessed by the different members of society play in economic analysis"
(Hayek, 1937, p. 33)

² A later consensus seems to be that Mises (1990) indeed acknowledged the theoretical possibility of a planned economy but rather rejected planning on grounds of practicability, cf. Greenwood (2007) or Lavoie (1985).

What Hayek essentially criticizes is the foresight assumption. Hayek, as many Austrian economists, is dissatisfied with how the underlying assumptions in neoclassical economics are treated and especially with concern to how the influence of the underlying foundations is insufficiently discussed. Thus Hayek posits that:

“[T]he concept of equilibrium itself can be made definite and clear only in terms of assumptions concerning foresight” (Hayek, 1937, p. 34).

Discontent with the state of economics, Hayek sets out to define a new equilibrium concept which takes the dynamic nature, and limitations of real life into account. Hayek defines equilibrium as:

“Actions of a person can be said to be in equilibrium in so far as they can be understood as part of one plan” (Hayek, 1937, p. 36).

Following from this definition Hayek draws two conclusions:

First, the actions of a person can only be considered to be in equilibrium if they are all part of one plan.

Second, since equilibrium consists of a relationship between actions, the passage of time is essential to give the concept of equilibrium any meaning (Hayek, 1937).

For society as a whole, another concept of equilibrium arises; this equilibrium is determined by whether there is compatibility between the plans of all individual actors. This equilibrium will remain as long as the external events correspond to the plans of individual members of society. From this, it is also clear that society cannot be thought of as in equilibrium if at the outset there is any discordance between the plans of individual agents. Equilibrium can only arise from this situation if agents modify their plans.

The economy will therefore never really be in equilibrium but perpetually move towards new equilibria as external occurrences take place. Both relevant knowledge and intentions of the members of society will become more and more aligned – until the next external occurrence takes place and the economy moves towards a new equilibrium.

10.1.1 *The division of knowledge*

Hayek introduces the concept "*Division of Knowledge*" to describe the economy's tendency to move towards such equilibria and he sees the market as the mechanism behind this process:

"[T]he spontaneous interaction of a number of people, each possessing 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, 1937, p. 49).

The idea is that through the market, agents implicitly share any new knowledge gained either deliberately or accidentally discovered. Since the market aggregates the knowledge of all agents, a planner must have as much knowledge as all the individual actors combined in order to produce the same outcome.

If the market is to produce the most efficient outcome, Hayek argues that individual agents would have to know how the resources they possess could be used better. They would not need to know the best use of every resource, but at least have knowledge on the resources they possess. The requirement for the market to be optimal is that:

"[E]ach of the alternative uses of any sort of resources is known to the owner of some such resources actually used for another purpose and that in this way all the different uses of these resources are connected" (Hayek, 1937, p. 52).

Hayek sees this condition as unnecessary and continues with a more realistic assumption that would also result in the most efficient outcome:

"[I]t will in most cases be sufficient that in each field there is a certain margin of people who possess among them all the relevant knowledge" (Hayek, 1937, p. 52).

Hayek thus argues that for the market outcome to be the best it is sufficient that amongst the actors on the market there is at least someone who possess the knowledge of how a resource can be best used.

10.1.2 Summing up Hayek's equilibrium argument

Essentially Hayek argues that the neoclassical idea of general equilibrium requires unrealistic assumptions and instead proposes a new Austrian equilibrium concept. Equilibrium is defined as when the plan of each agent is in accordance with one another. Within this framework, the knowledge embodied in individual agents is aggregated by the market. Each individual does not have to possess as much information in order for the market to achieve an efficient outcome as what is usually assumed in neoclassical models – the foresight assumption specifically. The economy is continually moving towards equilibrium without ever reaching it. Whenever some external occurrence causes the economy to be out of equilibrium, the market process will force existing plans to be modified and thereby the economy will move towards a new equilibrium.

The argument on the division of knowledge forms the basis of the Austrian critique of a centrally planned economy. The strength of the market mechanism is its ability to aggregate the knowledge of individual agents. For a central planner to reach the same outcome she would have to possess the combined knowledge of all agents.

Oscar Lange's proposed model of socialism, however, incorporates markets; if market socialism can aggregate knowledge as efficiently as Hayek's market there is nothing to hinder market socialism from yielding as efficient an outcome as the capitalistic market.

10.2 Hayek's critique of prices in market socialism

Hayek concedes that the market socialism proposed by Oscar Lange (Lange, 1994) may indeed be theoretically possible. However, to illustrate that he finds market socialism intractable in reality, Hayek quotes Pareto's (1927) contribution:

“We have seen that in the case of 100 persons and 700 commodities there will be 70,699 conditions [...]. We shall therefore have to solve a system of 70,699 equations. This exceeds practically the power of algebraic analysis, and this is even more true if one contemplates the fabulous number of equations which one obtains from a population of forty millions and several thousand commodities”. Pareto (1927) in Hayek (1940, p. 126).

For Hayek, the significance of quoting Pareto is because Pareto was used by the market socialists to prove that a central planner can indeed be theoretically efficient.

The reason that Hayek uses the quote from Pareto is that he finds the response from the market socialists as entirely missing the point:

“The fact is that it has never been denied by anybody, except socialists, that these formal principles ought to apply to a socialist society, and the question raised by Professor Mises and others was not whether they ought to apply but whether they could in practice be applied in the absence of a market” (Hayek, 1940, p. 127).

Thus Hayek argues that by proving that market socialism theoretically can be as efficient as the market misses the questions raised by Mises. Hayek interprets Mises’ original challenge as being a question on *how* socialism would implement the structures that would make it as efficient as capitalism. To answer this question, we can see that quoting Pareto is of little use:

“[N]one of these authors has made an attempt to show how these values, which a socialist society ought to use if it wanted to act rationally, could be found, and Pareto, as we have seen, expressly denied that they could be determined by calculation” (Hayek, 1940, p. 127).

10.2.1 *Prices*

Hayek’s use of Pareto is mainly to counter older iterations of planning schemes; Lange, as we saw in section 9.2, introduced a process of centralized trial-and-error to replace the Walrasian tâtonnement but also this construction receives Hayek’s scepticism:

“Professor Lange [...] assert[s] that even if the initial system of prices were chosen entirely at random, it would be possible by such a process of trial and error gradually to approach to the appropriate system. This seems to be much the same thing as if it were suggested that a system of equations which was too complex to be solved by calculation within reasonable time and whose values were constantly changing could be effectively tackled by arbitrarily inserting tentative values and then trying about till the proper solution was found” (Hayek, 1940, pp. 130-131)

This is an important critique of the proposed scheme of trial-and-error; any centralized planned prices can only be efficient if the planner is omniscient. Recall that Hayek argues that the price system embodies the collective knowledge of all agents in the economy and a planner must possess this information to reach an efficiency matching that of the capitalistic market.

Thus while Hayek concedes that centralized planning is not a theoretical impossibility; this is, in Hayek's view, not really conceding anything – the real issue is how to implement a system that actually works:

“When, however, one proceeds to consider the actual apparatus by which this sort of adjustment is to be brought about one begins to wonder whether anyone should really be prepared to suggest that, within the domain of practical possibility, such a system will ever even distantly approach the efficiency of a system where the required changes are brought about by the spontaneous action of the persons immediately concerned” (Hayek, 1940, p. 131).

There are, following Hayek, two things that must be made clear about the planner: how prices are determined and how information of price changes is to be distributed. We saw above that Lange proposed a scheme of trial-and-error. However, this has still not answered how a planner would make new prices known. Hayek quotes Lange saying that the planner would issue “factor valuation tables” (Hayek, 1940, p. 134) – thus from time to time a new set of prices would be decreed. Since the amount of ‘time’ is unspecified this leads Hayek to conclude:

“Whatever the method by which the S.E.C. [Supreme Economic Council] fixes prices, and particularly whatever the periods at which and for which prices are announced, there are two points about which there can be little question : the changes will occur later than they would if prices were determined by the market parties, and there will be less differentiation between prices of commodities according to differences of quality and the circumstances of time and place” (Hayek, 1940, p. 135)

Hayek's critique follows naturally from the Austrian view of the market process; the central actor is the ‘man on the spot’ who must have authority to change prices,

productive technologies and everything else that enters the market process when new opportunities face him. This is an argument that we return to in section 10.3.

For Hayek, any system with predetermined prices will restrain the entrepreneur from fully exploiting any opportunities she may be confronted with. In this sense Hayek's critique closely resembles Mises' argument that any recorded prices are simply historical facts and do not reflect agent's contemporary valuations.

10.2.2 Summary

While correct prices under market socialism are theoretically possible there are insurmountable challenges for anybody trying to establish prices centrally. Centrally established prices will, according to Hayek, always be too late and too coarse.

10.3 The price mechanism as aggregator of knowledge

Hayek's (1945) contribution is directed towards what a society must do to effectively take advantage of the division of knowledge and thus from this contribution a number of important insights can be gleaned.

10.3.1 The economic problem for society or the knowledge of time and place

The economic problem that Hayek sets out to solve is how society can make best use of the resources available to it:

“The economic problem of society is [...] not merely a problem of how to allocate ‘given’ resources [...] It is rather a problem of how to secure the best use of resources known to any of the members of society [...]. Or, to put it briefly, it is a problem of the utilization of knowledge not given to anyone in its totality” (Hayek, 1945, pp. 519-520).

For Hayek, it is crucial how this knowledge which “*is not given to the planner but to someone else*” is transferred from this someone else to the planner – where planner, so far, relates to someone organizing economic activity irrespective of societal structure.

The efficiency of a given society is determined by its ability to make fuller use of the existing knowledge. How to make use of this knowledge is central to Hayek's argument.

The knowledge that Hayek argues that society must be able to take advantage of is particular knowledge of time and place:

“We need to remember only how much we have to learn in any occupation after we have completed our theoretical training, how big a part of our working life we spend learning particular jobs, and how valuable an asset in all walks of life is knowledge of people, of local conditions, and special circumstances. To know of and put to use a machine not fully employed, or somebody's skill which could be better utilized, or to be aware of a surplus stock which can be drawn upon during an interruption of supplies, is socially quite as useful as the knowledge of better alternative techniques” (Hayek, 1945, p. 522)

There is within just about any trade a large degree of learning by doing, and it is exactly such knowledge Hayek argues that an economy must be able to exploit.

The knowledge, usually only possessed by few individuals, consists of specific information on how a given machine can be used more efficiently or how money can be made by arbitrage in a given market. This knowledge is eminently useful and can be used to increase overall societal efficiency. How to make use of this knowledge when making planning decisions is exactly what Hayek is concerned with:

“[T]he method by which such knowledge can be made as widely available as possible is precisely the problem to which we have to find an answer” (Hayek, 1945, p. 522).

Hayek asserts that a centralized government will be unable to aggregate this knowledge and that the appropriate institution for the aggregation of knowledge is the marketplace.

The reason is that the knowledge in question is knowledge of a kind which “*cannot be conveyed to any central authority in statistical form*”. Hayek thus distinguishes between scientific and unorganized knowledge. The former is the only information which can be transmitted to a central authority whereas the latter can most accurately be thought of as economic know-how (Greenwood, 2007).

To ensure efficiency Hayek calls for decentralization of any planning process:

“We need decentralization because only thus can we ensure that the knowledge of the particular circumstances of time and place will be promptly used” (Hayek, 1945, p. 524).

What Hayek calls for, is that decisions are left to the people who possess the relevant knowledge, and to ensure efficient use of this knowledge many decisions must, in other words, be left to the “*man on the spot*”.

This requirement holds for any economy. If the use of detailed knowledge is necessary to ensure efficient use of resources, then any economy that wishes to be efficient must decentralize decisions.

10.3.2 The distribution of knowledge

The next issue is what mechanisms society can rely on to aggregate and distribute, if not the direct knowledge, then the implications of the knowledge.

It must be made clear which information “the man on the spot” needs to know and how this information is brought about to him:

“There is hardly anything that happens anywhere in the world that might not have an effect on the decision he ought to make. But he need not know of these events as such, nor of all their effects” (Hayek, 1945, p. 525).

Hayek thus argues that the decision-maker can ignore why changes come about and instead focus on how the changes affect his decisions:

“It is always a question of the relative importance of the particular things with which he is concerned, and the causes which alter their relative importance are of no interest to him beyond the effect on those concrete things of his own environment “ (Hayek, 1945, p. 525).

When an external occurrence has changed the relative scarcity and thereby prices of resources, the person with the relevant economic know-how can consider simply the new situation facing her. She does not have to know why the prices have gone up or down but can impute the consequences of the change by reconsidering the costs and opportunities she faces.

Hayek argues that when faced with changes in available supply of any given good the importance is not why this change has occurred but instead the implications of the change:

“All that is significant for him is how much more or less difficult to procure they have become compared with other things with which he is also concerned, or how much more or less urgently wanted are the alternative things he produces or uses” (Hayek, 1945, p. 525).

Hayek argues that such changes in supply or demand will become embodied in the price system. Furthermore it is the price system that simplifies how “the man on the spot” can make decisions:

“It is indeed the great contribution of the pure logic of choice that it has demonstrated conclusively that even such a single mind could solve this kind of problem only by constructing and constantly using rates of equivalence [...], i.e., by attaching to each kind of scarce resource a numerical index which cannot be derived from any property possessed by that particular thing, but which reflects, or in which is condensed, its significance in view of the whole means-end structure. In any small change he will have to consider only these quantitative indices (or “values”) in which all the relevant information is concentrated; and by adjusting the quantities one by one, he can appropriately rearrange his dispositions without having to solve the whole puzzle ab initio [from the beginning]” (Hayek, 1945, p. 525).

Thus the price system allows for a more simplified decision making process when the importance of changes in the relative scarcity must be imputed. Hayek’s argument on the importance of economic know-how, prices and markets seems to tie in closely to Mises’ calculation argument; prices allow for more simplified decisions (Mises, 1990, 1998).

In Hayek’s argument, the importance of prices seems even greater than in Mises’ calculation argument; beyond determining profitability prices can:

“[A]ct to coordinate the separate actions of different people in the same way as subjective values help the individual to coordinate the parts of his plan “ (Hayek, 1945, p. 526).

Prices reflect the relative scarcity of various goods and any events which may affect the plans of agents will be communicated to him through the price system, however, Hayek does acknowledge some imperfections with the price system:

“Of course, these adjustments are probably never ‘perfect’” (Hayek, 1945, p. 527).

Given the Austrian preoccupation with the practical feasibility of economic systems, this can not be seen as a particularly important failure of the knowledge-argument; no economic system will be perfect. In his concluding statements, arguing against those who call for conscious direction of the price system Hayek argues:

“All that we can say is that nobody has yet succeeded in designing an alternative system in which certain features of the existing one can be preserved which are dear even to those who most violently assail it—such as particularly the extent to which the individual can choose his pursuits and consequently freely use his own knowledge and skill.” (Hayek, 1945, p. 528).

10.3.3 Summary of Hayek’s knowledge argument

To efficiently make use of all the knowledge held by most individual agents in the economy, it is important that decisions to buy and sell are decentralized. This will ensure that prices reflect the knowledge of most people hence resulting in the best use of resources. In contrast, the price signals in a centrally planned economy will not reflect relative scarcity and relative abundance, and this means that no one will know whether resources are used optimally.

11 ADVANCING ON THE CALCULATION DEBATE

In this section we will try to give a firmer understanding of the calculation debate by introducing some results from mainstream economics. To sum up the debate so far, Mises argued that private property rights and the catallactic process is necessary to yield prices that reflect the agents’ objective valuation of goods. Mises further argued that such prices are a necessity to perform rational economic calculation; any calculation based on other prices will be arbitrary. To counter this Lange argued, based on the Walrasian general equilibrium model, that rational economic calculation is indeed

possible in a planned economy. To achieve this result one simply replaces the Walrasian auctioneer with the planner. Responding to Lange, Hayek pointed out that the price structure embodies the combined knowledge of any agent in the economy; something the planner would have to do as well to mimic market efficiency. Hayek argued that to achieve efficiency an economy would have to be decentralized – and thereby denied Lange’s argument, that the Walrasian auctioneer can be replaced with the planner.

The debate in-brief is very confusing. At no point has a consensus emerged so it is not obvious what conclusions can be made. In order to get a better understanding of the discussion we will introduce some concepts from modern economic theory. The purpose is to introduce concepts and results that can help us draw some conclusions on the calculation debate.

11.1 Prices in modern economics – the first theorem of welfare economics

Some economists might argue that the first theorem of welfare economics can give credence to the Austrian argument of the superiority of the capitalistic price mechanism. The theorem, which can be proven mathematically under certain conditions, says that:

“If (\mathbf{x}, \mathbf{p}) is a Walrasian equilibrium, then \mathbf{x} is Pareto efficient”
(Varian, 1992, p. 326).

Where \mathbf{p} is a vector containing prices and \mathbf{x} is a vector containing the distribution of goods – that is how much of each good is distributed to each agent. Pareto efficiency means that you cannot make any agent better off without making another agent worse off. In other words all social welfare is distributed so there is no waste. For this reason ‘Pareto efficiency’ is sometimes called economic efficiency.

If you formulate the theorem a little differently by saying ‘market equilibrium’ instead of ‘Walrasian equilibrium’ you can easily get the idea that the theorem holds for prices and distributions observed in the markets of the real world. This would then accompany the Austrian critique of prices in a planned economy. However the assertion that the market results in a Pareto-efficient distribution does not constitute critique of a planned economy. If the theorem holds for real capitalistic markets this only means that we can be reassured of the economic efficiency of the observed distributions. However, the theorem does not show that a capitalistic market is superior to a planned economy.

On the contrary, Oscar Lange shows that the neoclassical theory can be used to support his market socialism. Lange uses the general equilibrium model of the capitalistic market to show how market socialism could employ the same structures. Lange can use the theory to counter the arguments of the Austrians, because under the strong assumptions of rational agents and perfect information almost all kinds of economic structures can produce efficient results. So it is a misunderstanding to see the first theorem of welfare economics aligned with the arguments of Hayek and Mises, because the theoretical implications benefit the proponents of planned economies.

A person who points to the first theorem of welfare economics as an argument for the superiority of the capitalistic price mechanism makes the same mistake as Oscar Lange. The mistake is to accept the Walrasian model as an accurate depiction of markets (Stiglitz, 1994). The assumptions regarding rationality and information, for example, are too strong to hold in real life. Agents are supposed to know their utility and profit functions and also maximize them using advanced differential calculus – this is clearly not realistic. The problem is not the neoclassical theory or models with rational agents. The problem is how we go from an abstract model to saying something about the real world. Stiglitz shows that the assumptions of asymmetric information and incomplete markets – both realistic assumptions – also are detrimental to the conclusion, that the market provides a Pareto-efficient outcome.

11.2 The demise of market socialism

The added simple, yet realistic, assumptions made the first theorem of welfare economics no longer hold true. This implies that Oscar Lange's market socialism fails as well.

Without Oscar Lange's counter-argument to Mises the calculation debate reduces to the Austrian contribution. In order to discuss the Austrian claim that prices in a capitalistic market are superior to those of a planned economy, let us first review how modern economics treat prices.

If we start with the Walrasian model, as described above, it is immediately evident that this does not help us. The prices in a neoclassical framework of perfect competition are exogenous, because perfect competition is defined as agents being price takers. This is true for both partial and general equilibrium models which create the theoretical

framework for proving the theorems of welfare economics. The price vector \mathbf{p} in a Walrasian equilibrium is given by an auctioneer, and students will remember having to calculate this equilibrium price at exams. So if something changes in the economy, the model of perfect competition cannot explain how the price vector changes and a new equilibrium is attained – because all the agents act as price takers. This line of theory does not get us very far if we want to try and comprehend the arguments proposed by Mises and Hayek. They argue that there are features in the capitalistic price mechanism which are superior to those of a planned economy.

11.3 Prices in modern economics – imperfect competition

A theoretical framework with exogenous prices cannot help us analyze the validity of the Austrians' argument. Instead, we need to look to models with endogenous prices – this means models of imperfect competition.

11.3.1 Monopoly pricing

The first basic model we can look at is one with a monopolist that maximizes profits by raising prices and in doing so, lowers production (Tirole, 1988, p. 66). An economic inefficiency occurs because there are consumers left who are willing to buy at prices higher than or equal to the marginal cost of producing extra goods. If we assume constant marginal costs the monopolists' problem can be expressed like this:

$$\max_p [(p - c)D(p)]$$

Where $D(p)$ is the demand as a function of price and c is the constant marginal cost. The solution to the problem is a mark-up price over the costs – where the size of the mark-up depends on the price elasticity of demand:

$$\frac{p - c}{p} = \frac{1}{\varepsilon}$$

Where $\varepsilon = -\frac{D'(p_m)}{D(p_m)} p_m$ is the price elasticity of demand at the monopolists' price p_m .

In a model of perfect competition, the difference between price and marginal cost is zero which would also provide economic efficiency. But the optimum for the monopolist is to set prices higher so $p_m > c$.

11.3.2 *The double marginalization problem*

Now assume that we have two firms; one produces intermediate goods and the other buys these intermediate goods and sells a finished good to consumers. We call the first firm wholesaler and the second retailer. If both these firms are monopolists we have the problem of double marginalization. The wholesaler solves the monopolists' problem:

$$p_w = \max_p [(p - c)D(p)]$$

Resulting in a price $p_w > c$ just as above. Now the wholesaler's price p_w enters into the retailers' optimization problem as costs so the retailer solves:

$$p_r = \max_p [(p - p_w)D(p)]$$

Where the profit maximizing solution is a price $p_r > p_m > c$.

In this example we end up with a chain of monopolies which results in even higher prices and less production and less economic efficiency.

The problems of double marginalization could be solved if the wholesaler and the retailer merged or if the wholesaler could control the prices of the retailer. Also the inefficiency of the monopolists' mark-up prices would in general be solved if firms could engage in price discrimination. Price discrimination is the ability to charge a different price for each individual consumer based on their willingness-to-buy. This would mean that all consumers who were willing to buy goods at prices equal to or above marginal costs would be serviced and it also means that the monopolist would earn a higher profit

11.3.3 *Oligopoly pricing*

It is unrealistic to assume a perfect monopolist, so one should also consider models where two or more firms engage in competition. If the firms compete by setting prices, it is called Bertrand competition. The optimum strategy for a firm in this situation is to set its price a little below its competitors and supply the whole market with its goods thereby leaving the competitors with zero demand. The optimal strategy for all firms is then to lower prices even more. The resulting Nash equilibrium is that all firms set prices equal to marginal costs. This yields an economic efficiency identical to the equilibrium in a perfect competition model and provides producers with small profits – zero if we assume constant marginal costs (Tirole, 1988). This will be the result if we

assume that the game is only repeated once because the firms will always have an incentive to lower prices until they reach the lower bound of their marginal costs.

The situation can be analyzed by setting up the game on normal form, where the firms can choose to 'cooperate' which is to maintain a high price or 'defect' which is to set a price below the competitors:

		Firm 1	
		Cooperate	Defect
Firm 2	Cooperate	$\frac{\pi_m}{2}, \frac{\pi_m}{2}$	$0, \pi_m$
	Defect	$\pi_m, 0$	$0, 0$

Where π_m is the monopoly profit that the two firms share if they both choose to cooperate on setting the high monopoly price. If one firm chooses to defect by setting its price just a little lower it can gain the whole π_m and the other firm is left with no demand and zero profit. If both firms choose to defect, by setting lower prices, eventually they will end up in the lower right corner where both firms receive zero profits.

11.3.4 *Tacit collusion*

However, if the price competition game is repeated indefinitely then it can be optimal to attempt other strategies. For the firms to cooperate it must be optimal for both firms to cooperate on maintaining high prices and share the monopoly profit, even though in any given period one firm could lower its price and supply to the whole market.

If both firms start out with a trigger strategy, meaning that the firm will choose to cooperate if both firms have cooperated at all times in the past, then cooperation is a Nash equilibrium. If a firm chooses to cooperate it will get $\frac{\pi_m}{2}$ in every period for infinity because the game is repeated, but if it chooses to defect it will get π_m for one period and zero profit for the infinitely many periods to come. This shows that it is possible for firms to cooperate on keeping prices high without making formal agreements thus giving it the name 'tacit collusion'.

The result is that even though we have competing firms we can still end up in an equilibrium that is as harmful to economic efficiency as the one a monopolist would provide (Tirole, 1988).

11.3.5 Summary of modern economic price theory

There are other models that give further insights into the role of prices in modern economics but the exposition above is sufficient to enable a comparison with the Austrian approach.

In both schools the price mechanism can provide different levels of efficiency but this is where the similarities stop.

If one accepts the framework of the modern economic price theory then the conclusion is the opposite of the Austrian theory. It is the profit motive that compels firms to take higher prices whenever they can in a capitalist economy, thus resulting in economic inefficiency. In a planned economy, however, the firms can be ordered not to use mark-up prices and thus removing the inefficiency. So the prices in a planned economy will result in a higher level of economic efficiency, and this contradicts the Austrian conclusion.

12 CONCLUDING REMARKS ON THE CALCULATION DEBATE

Even though the models of imperfect competition do not seem to correspond well with the Austrians, this does not mean that we can disregard Mises and Hayek.

The problem is that we are dealing with two entirely different schools of thought. Put simply, the Austrians consider the informational value of prices while economists today ask whether prices are too high.

First we turn to a more in depth discussion of the merits of Mises' calculation argument.

12.1 Mises' calculation argument

The malady that Mises sees in planned economies arises because economic calculation based on anything but prices born from catallactics will be arbitrary. Thus economic calculation based on arbitrary prices will not simply be inefficient it will be completely incorrect; any economic decision will be made on the wrong grounds since the price

signals in a centrally planned economy will not reflect relative scarcity and relative abundance.

In a comparison of the inefficiencies arising from modern economic price theory and the problems Mises considers, we therefore compare economic problems of very different magnitudes. If prices are arbitrary and planners have no idea how to compare different methods of production then this is much worse than inefficiencies arising from mark-up pricing.

The modern economic price theory is not incommensurable with Mises' calculation argument. The reason is that the theory considers the costs facing firms as exogenous.

Mises' costs are not exogenous – they reflect society's objective valuation if it is a capitalistic economy, and are arbitrary in a planned economy. So if we hold Mises' argument to be true this means that the manager in a planned economy cannot trust that the costs facing her, reflects the true opportunity costs of society. Even though mark-up pricing is banned in a planned economy this makes little difference. The big problem is that the costs facing the manager are arbitrary and do not reflect relative scarcity.

This illustrates that both modern economic price theory and Mises' calculation argument can hold true at the same time.

However, that Mises' claim is immune to opposing results from rigid models with strong logical arguments does not indicate strength. The immunity arises because the argument is circular. To see this consider the question:

Why is it impossible for a planner to mimic the capitalistic price mechanism in a planned economy?

Or in other words

What is the causality that necessitates that prices in a planned economy are arbitrary?

Mises' answer to these questions is that in a planned economy there are no property rights. When there are no property rights, there can be no catallactics. But this was what we wanted to prove in the first place. A planned economy is defined by the absence of

private property, and the reason why a planned economy cannot produce correct prices, is because of the absence of private property.

To prove or disprove Mises' claim one would need to have a very deep and thorough understanding of the capitalistic price mechanism. However Mises' work does not divulge enough specifics on the capitalistic price mechanism to fully understand his propositions. Instead one must 'invent' the missing causality, propose a capitalistic price mechanism and use this as basis for assessing the merits of both capitalistic and planned economies. This is exactly what Lange thought he did. Lange specified how he understood prices and used his framework to prove, that within planning will work.

Returning to Mises, without an explicit model that describes specifically why a planner cannot attain the same informative prices as the catallactic process, the Misesian argument will remain a faith-based argument. This means that the scientific validity of the argument is severely questioned; Mises' calculation argument contains no falsifiable predictions but only unverifiable claims on why a planner will be unable to perform rational economic calculation. Stiglitz also points out, that without a specified model the Austrian critiques remain faith-based (Stiglitz, 1994). We will, going forth, not consider Mises' calculation argument as a hindrance for rational economic conduct in a planned economy.

12.2 Critique of Hayek's knowledge argument

Hayek's argument is that prices embed knowledge and therefore the atomistic structure of the capitalistic market produces prices with more embedded knowledge.

If the knowledge argument is understood as a specification of Mises' argument, meaning that the knowledge argument is a specification of catallactics, then the argument is that we need atomistic agents, each with their private property, interacting on a market. The prices of this market will then more fully reflect the collective information and thereby better reflect relative scarcity. One must then ask why private property is necessary for correct prices and it then follows from our discussion above, that claiming such is a faith based argument.

Without detailed knowledge of the price-mechanism we can never fully understand the consequences of having publicly owned firms rather than private firms.

If we consider Hayek's knowledge argument by itself, then the first thing one could say is that a planned economy with a *decentralized* decision structure will be able to produce the same prices as a capitalistic market. In a planned economy the same people as in the capitalistic economy could be in charge of the decisions. The change would be the ownership to the means of production. These people could use markets to exchange goods and the prices from these markets would reflect supply and demand in the same way a capitalistic market does.

Secondly one could ask what consequences corporate concentration has on prices. When a sizeable portion of production is organized in very large firms then the prices will reflect only the knowledge of a small amount of people. This argument severely questions whether prices under capitalism are any better to reflect knowledge than what one could expect of a planned economy.

These two objections undermine the plausibility of Hayek's knowledge argument.

12.3 Conclusion on the calculation debate

The calculation debate started with Mises' proposition that rational economic calculation in a planned economy is impossible. When prices do not arise from interactions between agents with private property rights they will be arbitrary. We have shown that this essentially is a faith based argument.

Oscar Lange's argued that by replacing the Walrasian tâtonnement with a centralized trial-and-error process one could show that market socialism would be as efficient as any capitalistic market. This proposition, however, relies on the unrealistic assumptions of the neo-classical general equilibrium theory.

Hayek's argument that prices aggregate knowledge turned out to be unimportant in a comparison of capitalism with decentralized planning.

Since the calculation debate is the main contribution from the economic science to the debate on capitalism and planning, it is unfortunate that the net result of the debate is that no argument of scientific validity remains.

It is unfortunate, not only for the understanding of capitalism, but also for the debate in itself, that the central point of contention in the calculation debate has been on the price mechanism. The price mechanism is so tremendously complex that it is impossible to

fully comprehend. Because of the incomprehensibility of the price mechanism, it lends itself perfectly for faith-based arguments; something which, rather than opening up a debate, is an immediate show-stopper. The political emotions in the debate only serve to reinforce this difficulty.

In a debate based on logic and reason then it is unwise to embark on topics so complex, and where the extent of our knowledge is so limited, that we have to resort to faith based arguments. Whenever we try to discuss these complex matters within the context of a political debate we end up with partisans who rely on their own faith-based arguments. This is not conducive to debate since participants have an incentive to choose the faith-based arguments that provides for the conclusion they prefer. Instead economists (and others) should focus on more comprehensible issues – as we will do in part three.

As opposed to our approach, the calculation debate has focused on planning instead of capitalism. This is understandable as the general consensus at the time was in favour of socialism and there were many countries with various forms of planning. Today, however, the focus should be on capitalism since this is the dominant economic system and general consensus is in favour of capitalism.

13 HAYEK: INCENTIVES IN MARKET SOCIALISM

In addition to the knowledge argument, Hayek also has some practical arguments against market socialism – all concerning incentives. These arguments are often referred to in discussions on capitalism and planning and we will comment on the validity of each argument. Our purpose of doing so is to qualify the debate on the feasibility of planning.

13.1 Cost minimizing and market dynamics

Hayek criticizes the management of firms within market socialism, especially the behavioural rule in market socialism; that firm managers are instructed to set prices equal to marginal cost. This rule is supposed to replace the competitive pressure that, according to Hayek, ensures cost minimizing:

“The force which in a competitive society brings about the reduction of price to the lowest cost at which the quantity saleable at that cost can be

produced is the opportunity for anybody who knows a cheaper method to come in at his own risk and to attract customers by underbidding the other producers” (Hayek, 1940, p. 139)

The argument stems from the idea that market socialism will end up being too static. The Austrian view relies on entrepreneurs from outside a particular industry to step up and challenge the incumbent firms if they become inefficient. Hayek considers the planned economy unable to mimic this dynamic. Instead the central planner would have to know of, and approve of all improvements to production:

“Any improvement, any adjustment of the technique of production to changed conditions will be dependent on convincing the S.E.C. [Supreme Economic Council] that the commodity in question can be produced cheaper and that therefore the price ought to be lowered. [...] [E]very calculation by an outsider who believes that he can do better will have to be examined and approved by the authority, which in this connection will have to take over all the functions of the entrepreneur” (Hayek, 1940, p. 139).

The process of implementing any improved production or business technique is therefore, according to Hayek, an extremely cumbersome one.

13.1.1 Comment

The entire argument depends crucially on the fact that market socialism is a centrally planned economy. If we instead assume a decentralized planned economy then decisions on implementing any change can happen as fast as within a capitalistic economy. We will deal more thoroughly with the question of cost minimizing in section 21.

13.2 Too little production risk taking

Hayek further argues that the socialist manager will not be running appropriate risks. The reason is simple, it is easy for an outsider – the manager’s manager – to assess whether too much risk have been taken – for instance a too large production will manifest itself as a great surplus stock – but almost impossible to assess whether too little risk have been taken. After all, how can the manager’s manager measure unfulfilled wants? This leads Hayek to conclude:

“It is difficult to conceive that under these circumstances any of the necessary speculative activities involving risk-bearing could be left to managerial initiative. But the alternative is to fall back for them on that system of strict central planning to avoid which the whole system has been evolved” (Hayek, 1940, p. 142).

The essence of Hayek’s argument is that, since there is nothing to gain for the socialist manager by taking speculative risks, she will abstain from doing so. This is contrary to the Austrian entrepreneur who will, if she identifies a profitable opportunity, take the necessary speculative risk.

13.2.1 Comment

Just as the knowledge argument fails when confronted with the existence of larger firms, so does the argument that a socialist manager will take too little risk. The planner will have to look no further than how any modern firm in a capitalistic economy encourages its managers to take on an appropriate level of risks: by ensuring that the manager has a sufficient incentive for doing so. The principal-agent problems are the same in both capitalistic and planned economies.

13.3 Too much financial risk taking

The almost exact same question arises with regards to financial decisions. Hayek divides the problem into two sub-problems:

“[I]t is possible to divide this problem into two parts, the decisions about the distribution of the available capital supply and the decisions about the rate at which capital is to be accumulated” (Hayek, 1940, p. 142)

In other words the planner will first have to decide upon how much of society’s production must be withheld and used towards investments and *second*, decide how best to allocate these investments. Hayek sees this as a formidable challenge to the planner.

Under capitalism the interest rate is used as a rationing mechanism which helps with assessing which investments are worthwhile and which are not – much in the same way as prices reflect society’s valuation of different goods. Hayek argues that a planner will be unable to rely on interest rates to ration investments:

“Now however strong the desire may be to rely on the interest mechanism for the distribution of capital, it is fairly obvious that the market for capital can in no sense be a free market” (Hayek, 1940, p. 142).

The key is that the interest rate will not derive from a free market; not primarily because the market is absent but because there is no connection between the risk that society will face and the risk the borrower faces:

“It cannot be too often repeated, however, that the planning authority cannot be conceived simply as a kind of super-bank which lends the available funds to the highest bidder. It would lend to persons who have no property of their own. It would therefore bear all the risk and would have no claim for a definite amount of money as a bank has” (Hayek, 1940, p. 143).

Hayek argues that the absence of markets and the absence of personal risk-mitigating assets, increases the moral-hazard involved with banking. The reason Hayek sees this problem is that in his view the managers of socialist firms will not incur personal risk when a plant is engaged in an investment.

13.3.1 Comment

In a capitalistic economy, a bank has to assess the risks and the expected return of a project before lending out funds. The same is true for a financial institution in a planned economy. In a planned economy there can be a board that decides upon the allocation of society’s resources. Anybody who has a good idea can present it to one of these boards and argue its societal usefulness; just like an entrepreneur would have to convince a bank that her idea is profitable.

14 SHERMAN: BUSINESS CYCLES AND FULL EMPLOYMENT

Business cycles seem to be an inherent part of economic growth. Capitalist economies experience rising employment and higher growth in one period only to find the opposite in the next period. Booms are succeeded by recessions which are succeeded by booms again. The recurring periods of economic hardship has an adverse effect on individuals who lose their jobs, and are inefficient because of the existence of idle capital.

Sherman (1991) argues that business cycles can be eliminated in a planned economy because investment decisions can be controlled. A recession means higher unemployment and lower investments – both results of decisions made by firms. However, if firms were publicly owned the government could control the level of employment and investment directly and thus eliminate the business cycle (Sherman, 1991, pp. 386-391). Sherman envisions a decentralized planned economy where a central authority can step in if there is a need. If existing firms do not need more labour power then a decision can be made to setup new production lines.

14.1.1 Full employment

There is always a certain amount of unemployment in a market economy (Mankiw, 2003, p. 155). The theory of Non-Accelerating Inflation Rate of Unemployment (NAIRU) shows that zero unemployment is unattainable without rapidly rising inflation (Mankiw, 2003, p. 361). So within a capitalistic economy politicians and central bankers have an incentive to keep unemployment sufficiently high to avoid rising inflation.

Sherman argues that zero unemployment can be attained in a planned economy without causing inflation. The rationale is that prices can be controlled in a planned economy – where prices in a capitalistic economy is determined by atomistic agents (Sherman, 1991, p. 361). If the decisions made on the firm level in a planned economy nevertheless result in rising inflation then the central authority can act with direct central price control (Sherman, 1991). This means that the government in a planned economy has more tools available to combat inflation than in a capitalistic economy. In a capitalistic economy disinflation can only be attained by reducing aggregated demand while in a planned economy direct price control is also possible.

14.1.2 Comments on the business cycle and unemployment

It is a very interesting idea that business cycles can be avoided by controlling firm's investment and employment decisions. It is also intriguing to think of an economy where, due to price controls, full employment without increasing inflation is possible. These arguments, as presented by Sherman, are theoretically sound. They go to the core of each of the problems, unemployment and low investments are taken care of by deciding to hire more people and to invest more. Likewise the problem of rising prices – inflation – is taken care of by controlling prices. The question one must ask is whether it

is practically possible to control the economy without creating new problems. If it turns out that a central authority cannot control prices or employment without creating bigger problems, then the planned economy must suffer from business cycles and unemployment just like the capitalist economy.

It might be impossible to control prices effectively – we cannot say whether it is – but minimizing the effects of business cycles through public investments is merely a continuation of Keynesian macroeconomics, so this is not an unrealistic proposition. Zero unemployment could, however, create incentives for workers that are not beneficial for society. With zero unemployment the opportunity cost of losing a job is relatively low and workers might not have the proper incentives to work hard. This means that there might be a trade-off between creating a sound incentive structure and achieving zero unemployment.

Even if it turns out that a price control is impossible and that a planned economy will also have a certain positive amount of unemployment, the analysis still leaves us with an interesting point. Sherman has effectively connected large macroeconomic problems with the institution capitalism. He has shown that there is a direct line from private property rights to business cycles and inflation. So even though we might find that a planned economy cannot solve all of these problems we have come to a deeper understanding of capitalism.

15 ROEMER: A FUTURE FOR SOCIALISM

The debate on capitalism and planning has been largely neglected since the fall of the Soviet Union – that is the general picture. There are a couple of exceptions and Roemer's "A Future for Socialism" which was published in 1994 is one of these.

Roemer presents an alternative to capitalism which entails that the workers of a specific firm control the firm and also share the profit (Roemer, 1994). This means that when a worker gets a job at a new firm she automatically acquires a share of the controlling power and when profits are distributed the new worker will get a share of this too. This means that there still is a profit-incentive in the economy, and it also preserves the atomistic nature of the economy as in capitalism.

Roemer points out that the incentive problems for managers are the same in worker controlled firms as it is in stock-holder controlled firms. Stock-holders face a principal-agent problem in making sure that a hired manager will make decisions that are in the interest of the stock-holders. The problem is the same in a worker controlled firm – so comparatively the managers would perform equally well (Roemer, 1994).

The benefit of having worker controlled firms instead of private capitalistic firms is that it provides a more equal society that is more capable of dealing with externalities and public bads such as pollution. The creation of a more equal society, Roemer argues, is at the heart of the socialist movement (Roemer, 1994). The idea is that when profits are shared by the workers in a firm, then this increases the equality in society and it lowers the incentive to pollute:

“The problem in a capitalist economy is that there is a very small class of wealthy people who receive huge amounts of income as their share of firm’s profits, and it is generally in the interest of these people to have high levels of the profit-increasing public bads. The positive effect from the public bad on the income of members of this class more than compensates them for the direct, negative effect on their welfare” (Roemer, 1994, p. 57).

Because the income generated from profits constitutes a relatively small share of the worker’s income – but is the total of the capitalist’s income – the incentive to produce public bads and thereby increase profits is lower in a worker controlled firm. The workers are as negatively affected by public bads as a capitalist but in a worker controlled firm the monetary gain from producing public bads are smaller for each worker.

To summarize, the replacement of private capitalist firms by worker controlled firms has two beneficiary consequences namely more equality and a better environment.

As opposed to a publicly owned firm in a planned economy, the worker controlled firm would not have problems with a soft budget constraint. Roemer sees the soft budget constraint as one of the bigger problems with public ownership of the means of production. If a firm faces a soft budget constraint this means that it will be bailed out if it faces financial problems. On the contrary, a firm that faces a hard budget constraint

will shut down if it is not profitable. If managers in a planned economy are under the impression that they will be bailed out in case of high deficits then they do not have the incentive to make the firm profitable. This problem can only be dealt with by imposing a hard budget constraint on firms. This can, for example, be accomplished by having worker controlled firms who share profits and deficits.

15.1.1 Comment on Roemer's "A Future for Socialism"

By focusing on the equality and the environment Roemer is addressing groups who find these things important, namely the political left wing. This is unfortunate if Roemer wants to promote a debate with other political factions, for instance the political right wing.

Further, by proposing an alternative to capitalism that entails profit-motivated agents and preserves the atomistic nature of capitalism, Roemer's analysis is prevented from dealing with these two issues.

That Roemer is addressing the political left, while exempting important parts of capitalism from scrutiny, shows that his motivation is more political than scientific. Roemer attempts to aid a disillusioned left wing movement. He presents a new kind of socialism that encompasses markets and profit-motives while still promoting key left wing values.

16 NON-ECONOMIC ARGUMENTS IN THE DEBATE ON CAPITALISM AND PLANNING

In the following sections we will cover some important non-economic contributions to the debate on capitalism and planning. The arguments that we review are all presented by highly regarded economist.

16.1 Marx – Capitalism and Class Struggle

Karl Marx was not only an economist he also made important contributions within philosophy and sociology. Here follows a brief introduction to Marx's historical and sociological contributions to the analysis of capitalism.

Marx defines a class as a group of people with the same relation to the most important means of production. In a capitalistic economy there are two important classes, the

capitalists who own capital and workers who do not own capital. For now think of capital as machines (Karpusjin, 1980).

Historically other classes have been predominant. Before the agricultural revolution humans were hunters and gatherers with only small means of production because we were nomads. The hunter and gatherer societies were class-less societies. In the time of ancient Greece there were two important classes: slave-owners who owned other people and slaves who were owned (Karpusjin, 1980). At this point in time the most important mean of production was slaves – according to Marx two thirds of the population in ancient Greece were slaves (Karpusjin, 1980). In the middle ages the most important mean of production was land. The two important classes were landowning lords and the serfs who worked the lands of the lord (Karpusjin, 1980). After the French revolution and other revolutions throughout Europe, the feudal society was replaced with a capitalistic society. It is in this context one can understand the division between workers and capitalists in the capitalistic economy.

All of these historical periods – including our current – can be understood in terms of the most important classes. And there has been an antagonistic conflict of interests throughout history between the dominant classes (Karpusjin, 1980).

Capital is the important mean of production in the capitalistic economy, and a capitalist is defined as an owner of capital. Marx defines capital as money used to buy goods that are subsequently sold again for a profit:

Capital: Money – Goods – Money*

The proceeds from this interactions is then used again to buy and sell more goods to earn even more, so we have that capital accumulates.

A worker uses her money differently. She has some goods, maybe only her labour, that she sells to get some money and then she buys goods to consume:

Not capital: Goods – Money – Goods

There is no accumulation here, the worker will have to sell more goods, or more labour, in order to acquire the necessities of life. This definition of capital enables us to distinguish between self-employed tradesmen and capitalists.

Further notice that the ownership of capital provides the capitalist with a higher social status and with power. This means that if a capitalist spends some of her profits on consumer goods instead of investing it and accumulate more capital, she runs the risk of being outcompeted or losing her capital. When a capitalist no longer has capital to invest and accumulate, she is no longer a capitalist; she then becomes a worker and loses both power and social status. This would be equivalent to a medieval lord losing his title.

16.1.1 Comment on Marx: capitalism and class struggle

The understanding that there is an intrinsic conflict of interest between workers and capitalists, due to of a different relation to the means of production, and that there has been similar conflicts of interest between other classes throughout history is a very interesting point.

It is beyond our expertise to criticize the theory or to evaluate the possible deductions that could be made from it.

16.2 Schumpeter: Creative destruction and the entrepreneur

Joseph Schumpeter's book 'Capitalism, Socialism and Democracy' was published in 1947.

Schumpeter argues that one should have an evolutionary approach to the question of capitalism and planning. In contrast to a static analysis of monopolistic and oligopolistic competition where the usage of given resource is examined, Schumpeter focuses on the creation of wealth over time:

“A system – any system, economic or other that at *every* given point of time fully utilizes its possibilities to the best advantage may yet in the long run be inferior to a system that does so at *no* given point of time, because the latter's failure to do so may be a condition for the level or speed of long-run performance” (Schumpeter, 1962, p. 83)

Capitalism is a system that never fully utilizes the resources, for example because of incomplete competition. However, Schumpeter argues, it is the profit motivated monopolists that create wealth in the long run, through a process of creative destruction:

“[A] process of industrial mutations [...] that incessantly revolutionizes the economic structures *from within*, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism” (Schumpeter, 1962, p. 83).

The fact that capitalism is constantly changing makes the static analysis of for example monopolistic competition a poor measure of the economic efficiency of capitalism. The important variable in a capitalist economy is not the price:

“The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers’ goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalism enterprise creates” (Schumpeter, 1962, p. 83).

If this proposition is accepted then the models that analyze the pricing behaviour of a monopolist and the derived economic effects are meaningless. Instead one should analyze the entrepreneur whom Schumpeter sees as a key figure in the creation of wealth. The entrepreneurs are a group of people with certain personal traits. They are the pioneers of capitalism who boldly take on new business enterprises:

“To act with confidence beyond the range of familiar beacons and to overcome that resistance requires aptitude that are present in only a small fraction of the population and that define the entrepreneurial type” (Schumpeter, 1962, p. 132).

It is the desire to do things in new ways and to explore business opportunities that makes the entrepreneur a key to understanding the progress in a capitalist economy:

“The function of the entrepreneur is to reform or revolutionize the pattern of production by exploiting an invention or, more generally, an untried technological possibility” (Schumpeter, 1962, p. 132).

The pioneering ability of the entrepreneur also means that she is not needed in a formalized structure. Whenever a new production form is institutionalized or a research program is conducted within an already known research tradition, then the entrepreneur becomes obsolete.

16.2.1 Critique of Schumpeter: Creative destruction and the entrepreneur

Schumpeter's argument is that economists should disregard their static models and instead adopt a dynamic view of economic growth. It is not the current use of current resources but the ongoing creation and destruction of resources that is important for economic growth. The entrepreneur plays a key role in this creative destruction with her pioneering spirit.

The argument that people with certain personality traits contribute to economic growth hinges on a sociological understanding and is thus beyond our expertise. However, it is a very important point that the economic structure needs to nurture and exploit the combined qualities of all individuals.

If we agree with Schumpeter that the entrepreneurial spirit is an important factor in economic growth the question becomes whether a planned economy can be organized in a way that takes this into account. The question we need to ask is how well the entrepreneurial spirit is nurtured in a capitalistic economy, and whether a planned economy can mimic the results or even perform better.

If entrepreneurs in a capitalistic economy go to a bank to finance new business ideas then this can also be mimicked in a planned economy. One can imagine a government bank with a certain amount of resources reserved for experimenting with new ideas. There is nothing to hinder a planned economy from having government institutions where people of a pioneering spirit can come and suggest new methods of production.

If it is impossible to imagine a government institution which gives pioneers an opportunity to try new ways of producing, then we can allow for private property rights in minor parts of the economy. Our definition of a planned economy does not exclude the existence of private property rights it only mandates that the bulk of production is controlled by government institutions.

16.3 Hayek: The Road to Serfdom

In his book "The Road to Serfdom" Hayek argues that nationalization of the means of production will inevitably lead to a dictatorship. The book was published in 1944 where Hayek could observe a Europe with fascist Italy, Nazi Germany and Stalinist Russia, and he writes that:

“Few are ready to recognize that the rise of fascism and nazism was not a reaction against the socialist trends of the preceding period but a necessary outcome of those tendencies.” (Hayek, 2007, p. 59)

The first argument Hayek provides us with is to show that the socialist framework of thought is not very far from that of a fascist or a Nazi - at least on a personal level:

“The relative ease with which a young communist could be converted into a Nazi or vice versa was generally known in Germany, best of all to the propagandists of the two parties. Many a university teacher during the 1930’s has seen English and American students return from the Continent uncertain whether they were communists or Nazi and certain only that they hated Western liberal civilization” (Hayek, 2007, pp. 80-81).

It is not particularly important, that a young socialist can be converted to a totalitarian ideology, but it becomes important if a planned economy produces problems that are most easily solved with totalitarian solutions. The argument is that the socialist movement prepares the ground for a totalitarian take over in both the hearts and minds of people and in the political reality.

When control over the means of production goes from private enterprise to a central planning board the question is how the overarching plan is decided upon. Hayek argues that a democratic parliament will not be able to reach any reasonable decisions. The ‘social welfare’ which the parliament aims to maximize is ambiguous and leaves legislators with very little guidance. Every member of the parliament, and every individual voter, will have her own opinion about what the ‘general good’ is. The result is that:

“The inability of democratic assemblies to carry out what seems to be a clear mandate of the people will inevitably cause dissatisfaction with democratic institutions. Parliaments come to be regarded as ineffective “talking shops”” (Hayek, 2007, p. 104).

The problem is not with democratic institutions in themselves, but more with the nature of the decisions the parliament has to agree upon. Democratic parliaments are well suited for making effective decisions on general rules – in such cases agreements can be

made and a majority found either for or against a certain law. But when it comes to a detailed plan on every single part of the economy each Member of Parliament may have a different opinion, and thus the parliament may not be able to muster a majority for any single plan. This inefficiency produces a problem that can be most easily solved by removing the economic decisions from the democratic parliament:

“[A]greement that planning is necessary, together with the inability of democratic assemblies to produce a plan, will evoke stronger and stronger demands that the government or some single individual should be given the powers to act on their own responsibility. The belief is becoming more and more widespread that, if things are to get done, the responsible authorities must be freed from the fetters of democratic procedure” (Hayek, 2007, p. 108).

Dictatorship becomes the rational solution because democracy is too inefficient. The next step for Hayek is to show that even more individual freedoms will suffer from the rising of a non-democratic planning board.

That every individual is equal before the law is a cherished civil liberty and without it the government could strike arbitrarily on its citizens. But arbitrariness is a necessary result when the government has to make specific decisions regarding the economy, such as choosing between higher wages for doctors and better health care or between cheaper milk and better wages for agricultural workers.

“There can be no doubt that planning necessarily involves deliberate discrimination between particular needs of different people, and allowing one man to do what another must be prevented from doing” (Hayek, 2007, p. 116).

Apart from being in opposition to a civil liberty the effect of arbitrariness also creates discontent among the people, according to Hayek. The reason is not, that one cannot be unfortunate in a capitalistic economy; the reason is that if you are unfortunate in a planned economy then this is a consequence of government action:

“There will always exist inequalities which will appear unjust to those who suffer from them, disappointment which will appear unmerited, and strokes of misfortune which those hit have not deserved. But when these

things occur in a society which is consciously directed, the way in people will react will be very different from what it is when they are nobody's conscious choice" (Hayek, 2007, p. 137).

This growing discontent, with the central planning board as a clear culprit, will in effect make a planned society unstable. To counter the public's dissatisfaction Hayek argues that the regime will engage in propaganda and control over the media in order to convince the people that 'the plan' is a good idea:

"To make a totalitarian system function efficiently, it is not enough that everybody should be forced to work for the same ends. It is essential that the people come to regard them as their own ends. [...] If the feeling of oppression in totalitarian countries is in general much less acute than most people in liberal countries imagine, this is because the totalitarian governments succeed to a high degree in making people think as they want them to" (Hayek, 2007, p. 171).

To contain public anger against the planning board it is not enough to prevent critical voices in the press. The regime also has to make sure that positive stories are told – even if they are not true. This, says Hayek, is not only the end of free speech it is the end of truth.

The historical evidence of planning in the Soviet Union and the rest of the Eastern Bloc has shown nothing to challenge Hayek's idea, that planning necessarily leads to despotism.

16.3.1 Critique of Hayek's The Road to Serfdom

To sum up the argument in "The Road to Serfdom": a democratic assembly will not be able to decide on a plan for the whole economy so the planning needs to be done by a non-democratic body. But when people feel unfortunate in their economic situation they will be right to divert their anger towards the government which will lead the planners to try and control the public by controlling the media.

If it is true that a planned economy necessarily leads to a totalitarian system, then the debate ends here. It would be hard to find even a single advocate for a planned economy if it meant giving up the freedoms of a free democracy. So if the analysis on capitalism is

to continue we either have to counter the arguments presented or suggest a different alternative to capitalism or simply disregard Hayek's arguments by assuming (hoping) that he is wrong.

A mixture of countering and suggesting another alternative is possible. Hayek's argument hinges on the assumption that it is a centrally planned economy. We can instead assume a decentralized planned economy where economic decisions are decentralized. Some decisions are made on the level of the firm, some on the level of a city municipality and others at the national or federal level. If this decentralization makes it possible to make decisions fast and efficiently we no longer travel on the road to serfdom, because the first step was the public's call for efficient decision making. This means that Hayek's argument no longer constitutes a debate-stopper

16.4 Friedman: Capitalism and Freedom

In 1962 Milton Friedman published his book "Capitalism and Freedom" where he argues that any state intervention is a violation of individual freedom. This is in contrast to Hayek's argument, that planning *in turn* will lead to serfdom.

The difference between Hayek's argument and Friedman's is that the latter is not only defending capitalism against planning but also criticizing any expansion of the welfare state.

In the eyes of Friedman freedom is the opposite of any centralization of power:

"Political freedom means the absence of coercion of a man by his fellow men. The fundamental threat to freedom is power to coerce, be it in the hands of a monarch, a dictator, an oligarch or a momentary majority. The preservation of freedom requires the elimination of such concentration of power [...]" (Friedman, 2002, p. 15).

The existence of a 'power to coerce' is a threat to political freedom and if the power is exercised this constitutes a violation of freedom. Friedman mentions a momentary majority and a dictator as having the power to coerce. This means that Friedman essentially is comparing an expansion in the power of a democratically elected government to that of a dictator.

Friedman argued that the competitive capitalistic market can protect individuals from coercion because:

“The consumer is protected from coercion by the seller because of the presence of other sellers with whom he can deal. The seller is protected from coercion by the consumer because of other consumers to whom he can sell. The employee is protected from coercion by the employer because of other employers for whom he can work, and so on” (Friedman, 2002, p. 14).

So the market ensures freedom from coercion because agents make voluntary transactions with each other and you can always find others to do business with.

16.4.1 Example: How capitalism ensures the freedom of speech

To elaborate on this point, Friedman provides an example by asking the question:

How can the freedom to advocate capitalism be preserved and protected in a socialist society?

First of all, we cannot be sure that proponents of capitalism can earn a living when all jobs are under the control of political authority. Even if we are willing to assume that they can preserve their job, there are still difficult questions:

“For advocacy of capitalism to mean anything, the proponents must be able to finance their cause – to hold public meetings, publish pamphlets, buy radio time, issue newspapers and magazines, and so on. How could they raise the funds?” (Friedman, 2002, p. 17).

Friedman argues that it would be difficult to raise funds for supporters of capitalism. Even though there may be men and women with large income and wealth in a planned economy it is most likely that these people are high-ranking public officials:

“It is possible to conceive of a minor socialist official retaining his job although openly advocating capitalism. It strains credulity to imagine the socialist top brass financing such ‘subversive’ activities” (Friedman, 2002, p. 17).

In order to finance an anti-socialist group within a planned economy one would have to persuade many people to donate and this is very difficult. The problem of financing radical groups in a capitalistic economy is much easier. If the production of a book or a magazine is seen as profitable then it will be published. A competitive publisher cannot afford only to publish writings she agrees with:

“In this way, the market breaks the vicious circle and makes it possible ultimately to finance such ventures by small amounts from many people without first persuading them. There are no such possibilities in the socialist society; there is only the all-powerful state” (Friedman, 2002, p. 18).

Even if the problem of raising funds is solved this is not enough in a planned economy:

“The hypothetical supporter of capitalism would have to persuade a government factory making paper to sell to him, the government printing press to print his pamphlets, a government post office to distribute them among the people, a government agency to rent him a hall in which to talk, and so on” (Friedman, 2002, p. 18).

In a capitalist economy a private paper merchant would be happy to sell to anyone, no matter the use of the paper. This is how the profit motive ensures freedom and why freedom cannot be guaranteed in a planned economy.

Friedman points to an illuminating example of how commercial interest countered a government’s attempt to limit free speech. In 1947 about 150 writers were blacklisted because they were suspected communists. But by using pseudonyms the blacklisted writers were hired anyway;

“[T]he fact that people who are running enterprises have an incentive to make as much money as they can, protected the freedom of the individuals who were blacklisted by providing them with an alternative form of employment, and by giving people an incentive to employ them” (Friedman, 2002, p. 20).

The point is that if all of Hollywood were government owned, the blacklisted writers would not have had the opportunity to work.

Just to erase any misunderstandings, Friedman does agree that there should be a government and that this is a prerequisite for having a well functioning capitalistic market. He also believes that government activity can be justified when there are problems of externalities or public goods. But government activity is an externality in itself because:

“Every act of government intervention limits the area of individual freedom directly and threatens the preservation of freedom indirectly”
(Friedman, 2002, p. 32).

So it is a goal in itself that government activity is kept at an absolute minimum.

One could argue that the power of the government in a planned economy is simply power transferred away from the capitalist. The decisions formerly made by capitalists are now made by the government and where our lives were controlled by powerful firms it is now controlled democratically. However, for Friedman and also for Hayek, the point is that the government has complete power while the power is divided between different owners of property in a capitalistic economy.

16.4.2 Critique of ‘Capitalism and Freedom’

There are two arguments that we must address.

First, the freedom and possibility to support capitalism cannot be guaranteed in a planned economy.

Second, government in itself limits individual freedom.

If we start with the second argument we can notice that there is a difference between Friedman’s freedom argument and Hayek’s. While Hayek illustrates how a planned economy evolves into a dictatorship and thereby limits freedom, Friedman believes that freedom is limited by the mere existence of government intervention. Hayek presents a line of argumentation that can be countered, for example if one could show that decentralized planning can be effective and democratic. Friedman’s argument stands and falls on the perception of whether the government intervention is a direct opposite to individual freedom. Where Hayek points to a more universally accepted definition of freedom – the absence of despotism – Friedman defines freedom as the absence of centralized power.

This reduces the argument to questions of emotions. If a person does not feel that government intervention is reducing her freedom then the argument is without effect. It also works the other way; if someone does feel uncomfortable with a large government then she can never be persuaded to support planning. And, conversely, anybody who feels uncomfortable with private firms not being democratically controlled is just as entitled to their emotions.

Also Friedman uses his freedom argument to criticize any expansion of the welfare state such as government run universal healthcare because it means an expansion of government.

Regarding the argument that the freedom to argue against a planned economy will never be guaranteed by the state, one can only say that Friedman is right. The government can never protect its citizens from itself. In a democracy the majority can never guarantee the rights of a minority. Even if protection of minority rights is written into the constitution it is still possible for a large majority to change it.

17 CONCLUDING REMARKS ON THE HISTORIC DEBATE ON CAPITALISM AND PLANNING

As we discussed in the introduction, economics has the potential for accommodating a very fruitful debate on capitalism and planning. With its rigid logics and a focus on economic efficiency, economics provides basis for political opponents to debate important issues without ending up in a dead-locked debate.

However, when we consider how economics has contributed to the debate the potential has not been used to its fullest. Karl Marx's surplus value theory is reduced to an ethical assertion of whether a capitalist is entitled to the profits she earns. Any proponent of capitalism can argue that she feels that a capitalist is very much entitled to a fair share of the wealth of society and then the debate is dead-locked. The surplus value theory – and other contributions from Marx – might be very interesting and they might also give important insights into the workings of a capitalist economy. But the issues are hard to discuss with proponents of capitalism and this makes it much harder to assess the scientific validity of Marxist claims.

The contributions that constitute the calculation debate did not bring about much insight either. Mises' devastating critiques of a planned economy turned out to be inherently faith-based. The absence of a specified price-mechanism made it impossible to assess the scientific validity of the calculation argument. Hayek's critique of a centrally planned economy is interesting and logically sound – but when capitalism is juxtaposed with a decentralised planned economy then Hayek's argument no longer holds. This means that Hayek's argument no longer constitutes a debate-stopper. Oscar Lange's market socialism is based on an unrealistic model of how a market works – so his arguments become equally unrealistic.

All in all the calculation debate has left us without any insights into the important institution of private property. Instead the economists focused on faith based arguments and the debate ended up in a dead-lock.

Roemer's approach might be very interesting but it is not accommodating for a discussion with political opponents, and this is a weakness. Worker controlled firms might be both realistically viable and beneficent to society. But, because Roemer focuses on economic equality and the environment, his contribution is only relevant to groups that share these concerns. For some reason concerns about economic equality and environmental protection are not universal, they are prevailing mostly in left wing groups. This means that Roemer's contribution cannot act as basis for an accommodating discussion between political opponents.

Sherman provided an interesting insight by connecting the features of capitalism with important economic problems. Sherman asked a concrete question of whether capitalism or planning would be better at handling business cycles and unemployment. This turned out to be a fruitful approach. In the next section we will provide more examples of how economics can be used to addresses specific problems in connection with the debate on capitalism and planning.

If we consider the non-economic arguments, they fall in the same category as Roemer. They are all very interesting and valid but not accommodating for a discussion that can lead to a better understanding of the world we live in.

Milton Friedman's ideological disdain of big government is real felt – but it is only felt. We can never prove that government actions limit personal freedom more than

corporate actions do – but we can discuss how we feel about government and private corporations. That is all very interesting but not very suitable if the goal is to understand capitalism.

Hayek's argument that a planned economy necessarily ends up in a totalitarian regime is another debate-stopper. If Hayek's claim holds true then it is futile to compare capitalism with planning. However, it only holds for a centrally planned economy, and if we compare capitalism with a decentralized planned economy then the comparison is no longer futile.

18 DESCRIPTION OF A DECENTRALIZED PLANNED ECONOMY

We have shown that much of the historic literature on capitalism actually was concerned with the adverse effects of centralised planning. Instead of presenting arguments to the contrary we simply proposed that capitalism should be juxtaposed with a *decentralised* planned economy. This means that we can retain a focus on analysing capitalism, which is the predominant economic system in the world today.

The purpose of this description is to present an economic structure that is perceived as realistic and where there is no private property of the means of production no profit-motive and no atomistic competition. This will enable us to analyse these specific features of capitalism

Some might argue that it is impossible to have a decentralised planned economy – and that may be true. However we will try to give a description which can help our reader to imagine how such a planned economy might work.

Consider the structure of the modern cooperation, where stockholders appoint a board which in turn hires managers to run the firm most profitably. If all firms were controlled by the government we could preserve this structure of capitalistic firms. Imagine that the board consisted of stake-holders instead of stock-holders. We can imagine that there are different members of the board who represent different interest groups. The board would hire managers, maybe even the same persons who managed the capitalistic firm, however their task would not be to make the firm most profitable. Instead the board can give the manager instructions to pursue different kinds of objectives, 'the common good' is one example, ensuring efficient production and

provision is another. The board can hold the manager accountable for her decisions, just like a board can in a capitalistic firm. Finally, the central government can abstain from bailing out non-profitable firms to enforce a hard budget constraint upon the firms. The firm's manager will then have the incentive to control wasteful spending, if she wants to keep her job.

The individual firms can sell and buy goods from each other exactly like in a capitalistic market. The only difference is that the firms are publicly owned. Decisions on prices can be as decentralised as they are today, meaning that individual firms are free to set prices as they want.

If we can ensure that the board has the incentive to pursue the common good then we have a structure which is both decentralised, without private property and where the profit motive has been replaced by a motive to pursue the collective interests of the citizens.

How the democratically elect officials are given incentives that ensure that the decisions made by these officials are aligned with the interest of the citizens is one of the major remaining stumble blocks. Assume that these issues can be overcome by further research into political economy and by delegating decisions such that, to the largest extent possible, decisions are made by those who are affected by it. Compare finally the assumptions and results with the alternative that decisions are made completely outside democratic control, as in capitalism.

By allowing for a form of central coordination, then one can also get rid of the negative aspects of atomistic competition which is a characteristic of capitalism. We can do this by assuming that the central government can issue directives centrally which the individual firms' boards and managers effectuate. We can also assume that there is a body where representatives of different industries can coordinate centrally. Imagine for example that representatives meet and vote on a central directive. This can ensure a mean of collective action and coordination in the economy which is not present in capitalism.

One might ask how incentives for workers are ensured. We can assume that the incentives for a hired worker are the same in planned economy as in a capitalistic economy. If we further allow for the existence of unemployment, then this will produce

an additional monetary incentive to work and an incentive to avoid being fired. There is nothing to hinder a planned economy from being as – or even more – economically unequal than a capitalistic economy. If an unequal economic structure is a prerequisite for efficiency so be it.

Small parts of the economy can still function with private property. And there is no reason to inhibit individuals from trying to make money, if they can, by providing services to their fellow citizens. If an entrepreneur, however, wants to set up a larger production she would have to finance this operation. Here enters the public bank. We can imagine that with a loan comes also a board representing the interest of the citizens.

To make this kind of decentralized planned economy be perceived realistic, we have built it on existing structures. There might yet be large problems with such an economic structure that we have not dealt with, but we ask that these issues are, at least initially, assumed solvable. We can then continue with an analysis of predominant economic system of today: capitalism.

It should not be perceived as especially partisan to assume that problems with a decentralised planned economy can be solved, on the contrary. One can disregard some problems now, and continue with an investigation of capitalism that maybe will lead to a critique of capitalism.

The point is that, by assuming that any remaining issue is solvable, a discussion of the merits of capitalism can be accommodated, even though proponents of capitalism may not be convinced that planning is possible. We believe that this approach is fruitful since the single purpose of this thesis is to discuss and further understand capitalism.

PART THREE

CAPITALISM AND MODERN ECONOMICS

The question we set out to answer was how economics could contribute to the understanding of capitalism. The literature has so far not contributed very much. First, because the historic focus was on alternatives to capitalism – instead of an analysis of capitalism. Second, due to the extensive use of faith-based arguments, the debate got into a deadlock. The best arguments were found in the non-economic part of the contributions, they however also lead to a deadlock because they rely heavily on ethics.

In this section we will follow the example of Sherman, who asked a concrete and not too complex question and used the tools of economics to present an argument.

We present five analyses all with a focus on understanding whether a capitalistic or planned economy will achieve the highest level of efficiency.

Efficiency can be understood in two ways, which economic system is better at utilizing the resources at hand and which economic system is better at generating higher levels of growth. One could say that we must discern between making sure that resources are used optimally today, but we also ensure that resource allocation must be optimal in the future.

19 BASIC GROWTH THEORY

To discuss the merits of capitalism with regard to economic growth we will first go through some of the basic theory on growth. (approach adapted from: Obstfeld & Rogoff, 1996; Sørensen & Whitta-Jacobsen, 2005)

The outset for our analysis is the Solow growth model where we assume that GDP, Y_t , follows a Cobb-Douglas function

$$Y_t = A_t K_t^\alpha L_t^{1-\alpha} \quad (1)$$

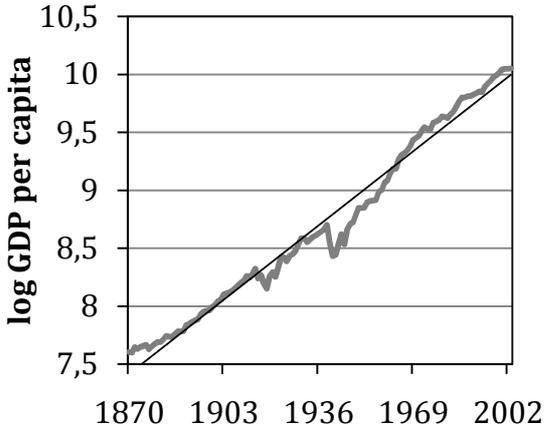
In equation (1), A_t is total factor productivity (TFP) at time t , K_t is the amount of capital at time t , L_t is the amount of labourers at time t . The total factor productivity, A , is Hicks-Neutral, which means that TFP augments both capital and labour. If we assume that $\alpha \in [0; 1]$ then it follows that the economy exhibits constant returns to scale in both capital and labour – a doubling of both capital and labour will lead to double the output. Equation (1) further tells us, that an increase in wealth can come about from either an increase in total factor productivity, a larger amount of capital or from more labour.

However, we are interested in GDP per capita and not total GDP. We can divide equation (1) by L_t to get per worker GDP. If we are willing to assume that all members of the population works, then per worker GDP is comparable to a per capita GDP. Per worker GDP is then:

$$\frac{Y_t}{L_t} = \frac{A_t K_t^\alpha L_t^{1-\alpha}}{L_t} = A_t \frac{K_t^\alpha L_t^{1-\alpha}}{L_t} \Leftrightarrow y_t = A_t k_t^\alpha \tag{2}$$

In equation (2) y_t is GDP per worker and k_t is capital per worker. It now follows that to increase GDP per worker either total factor productivity must increase or the capital-labour ratio must be increased. Since $\alpha \in [0; 1]$ there are however decreasing returns to the capital-labour ratio. The growth rate in output will therefore tend to decline as the capital-labour ratio increases.

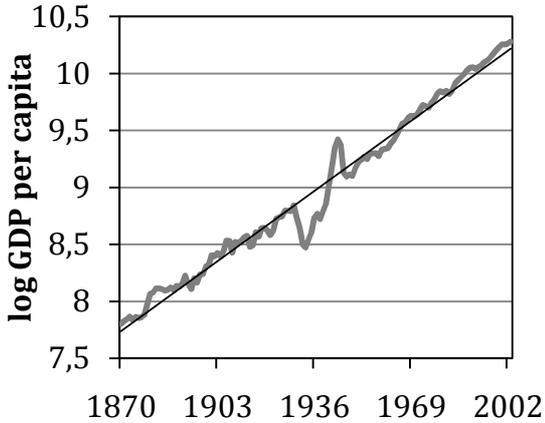
Figure 3. Evolution of per-capita GDP, Denmark 1870 thru 2003



Note: Average GDP per capita growth rate is 1.94 percent.

Source: Maddison (2007).

Figure 4. Evolution of per-capita GDP, United States of America 1870 thru 2003



Note: Average GDP per capita growth rate is 1.86 percent.

Source: Maddison (2007).

This is an important theoretical insight. If we assume that there is no growth in total factor productivity, then economic growth will tend to stagnate. However, consider figure 3 and figure 4.

From the figures above it is obvious that output growth is not stagnating. In order to have non-stagnating growth we must assume growth in total factor productivity. This can be clearer, if we take logs of equation (2), and first difference we get:

$$\begin{aligned} \ln(y_t) - \ln(y_{t-1}) &= (\ln(A_t) - \ln(A_{t-1})) + \alpha(\ln(k_t) - \ln(k_{t-1})) \\ &\Leftrightarrow \\ g_t^y &= g_t^A + \alpha g_t^k \end{aligned} \tag{3}$$

The long run growth rate of GDP per worker, g_t^y , thus depends on the growth rate in total factor productivity, g_t^A , and the growth rate of capital per worker, g_t^k .

The point we want to make clear is that growth the long run growth pattern of per capita GDP, is only theoretically possible if there is growth in total factor productivity.

19.1 Evidence of the importance of total factor productivity

A number of empirical studies have studied the importance of total factor productivity.

In his seminal paper on technical change and the aggregate production function Solow (1957) found that only roughly 10 percent of non-farm US per capita growth in GDP from 1900 thru 1949 can be explained by growth in the capital-worker ratio; the rest of GDP growth had to be due to growth in total factor productivity.

In more recent times, total factor productivity has been as important for growth, cf. Table 2. In the major OECD countries total factor productivity has accounted for roughly 50 percent of GDP growth in the post-war period. One notable exception is that TFP has only accounted for 13 percent of GDP growth in post-1969 USA.

There are therefore good reasons to investigate what factors can increase the growth rate of total factor productivity. Note that Table 2 refers to growth in GDP and not GDP per worker. In an analysis accounting for the factors driving growth in the East Asian tiger economies from 1966-91 Klenow and Rodríguez-Clare (1997) find that total factor

productivity accounts for 50 – 70 percent of GDP per worker growth in Hong Kong, South Korea and Taiwan.

Table 2. Growth accounting in selected OECD countries.

Economy	Share of capital in national output	GDP growth	Share contributed by		
			Capital	Labour	TFP
OECD 1947-73					
France	40 %	5.4	41	4	55
Germany	39 %	6.6	41	3	56
Italy	39 %	5.3	34	2	64
Japan	39 %	9.5	35	23	42
United Kingdom	38 %	3.7	47	1	52
United States	40 %	4.0	43	24	33
OECD 1969-90					
France	42 %	3.5	58	1	41
Germany	40 %	3.2	59	-8	49
Italy	38 %	4.1	49	3	48
Japan	42 %	6.8	57	14	29
United Kingdom	39 %	2.5	52	-4	52
United States	41 %	3.1	45	42	13
Source: Easterly & Levine (2001)					

It must be noted, that in empirical assessments of the components in GDP growth, total factor productivity is the residual. Thereby TFP will capture everything but factor accumulation. One could say that TFP growth constitutes everything we do not know. So to understand the determination of economic growth one must try and understand what factors are included in TFP.

19.2 How does capitalism affect total factor productivity?

In the following sections we will analyze the influence of capitalism on a number of the factors that are part of TFP. The following sections thus both serve as an inquiry into the welfare effects of capitalism but also as a demonstration of how the economic science is aptly suited for understanding issues that can be both politically and emotionally laden.

First, we examine the incentives a profit-motivated firm has to invest in research and development. With more research we can acquire more knowledge, which can enable us to make new and better products or enhance production technology to produce cheaper

and faster. Technological progress is widely regarded as an important part of TFP growth.

Second, we discuss whether a private firm or government firm will be most cost efficient. With a high level of cost minimizing we can use resources more efficiently and this can affect both the level and growth in TFP.

Third, we look into the ability of capitalism to exploit economies of scale is. A more efficient utilisation of economies of scale means that we get a higher production with the same resources. This translates into a higher level of total factor productivity and thereby increases the wealth of an economy, but does not necessarily increase the growth rate of TFP.

Fourth, we examine the capitalistic market's effects on both the provision and quality of children. Child quality is understood as the human and social capital embedded in children. Human capital is the quality of labourers in the economy and social capital reflects the level of trust in the economy, both have been found to be important factors in TFP growth. The issue with child quantity is that in modern societies children can be seen as a public good, it is therefore plausible that some participants in the economy will free-ride on the provision from others.

Finally, we analyse how issues of coordination failure in a capitalistic and a planned economy are handled. When there are coordination failures in an economy it means that the agents do not have the incentive to change strategies even though the economy is in an in-optimal equilibrium. An economy with prevalent issues of coordination failure will, all else being equal, produce less efficiently. The issues with coordination are closely related to the issues of business cycles.

20 RESEARCH AND DEVELOPMENT

Research and Development (R&D) is widely regarded as an important part of growth in TFP - for example Romer (1990) builds an endogenous growth model that incorporates R&D. Mathematical modelling is not necessary to show that R&D is important in creating growth in TFP. Think of computers for example, ten years ago computers were made of basically the same raw materials as they are now; plastic, copper, iron oxide etc. – but today these raw materials are arranged slightly differently and the computer is maybe

fifty times as powerful. The increased knowledge of how to improve productivity and reduce costs lies in the heart of economic growth (Romer & Griliches, 1993).

We will now analyze R&D in relation to the debate on capitalism and planning. We suspect that most people believe that capitalism is superior to planning in producing the right incentives for innovative research. We show that the contrary is true; planning actually provides the environment most beneficial for innovative progress.

20.1 The nature of research and development

The purpose of a R&D is to create new knowledge. While R&D is thought of as an intentional effort to produce knowledge, new insights can also come about by accident. We will first analyze the intentional effort where agents invest in R&D in order to gain scientific results. To do this we must understand the basic features of knowledge.

20.1.1 Public good

Knowledge has certain resemblances to a pure public good. A public good is characterized by being non-excludable and non-rival (Varian, 1992, p. 414). If a good is non-excludable this means that it is impossible to exclude people from consuming it and non-rival means that the consumption by one person does not reduce the amount available for others. One can say that non-rival goods do not diminish while rival goods are diminishable (Varian, 1992).

Street lights are often used as examples of public goods. One person's consumption of an illuminated street does not diminish the amount of light available for other street walkers – this makes street lights a non-rival good. Also it is not possible to let some people on a certain street enjoy the light and at the same time prevent other people on the same street from benefiting from the street light. A street light is both non-rival and non-excludable thus making it a pure public good.

A private good is rival and excludable and most goods are private. An apple, for example, is a rival good in the sense that if you eat it no one else can – and it is also excludable, you simply hold on to the apple and prevent others from taking it.

Knowledge is non-rival but only partially non-excludable which makes it resemble a pure public good but it is not a pure public good (Hall, 2002). The non-rival aspect of knowledge is obvious because it is non-diminishable. For example the mathematical

theory of differential calculus can be used by many people all over the world at the same time without any disturbance to one another. This is true for every piece of knowledge. It is possible to exclude some from using certain scientific ideas or results either by keeping it secret or if a government issues a patent. Hall (2002) mentions the recipe for Coca Cola as an example of a piece of knowledge that has been successfully kept a secret. Beside these two exceptions knowledge can easily be provided without anyone being excluded from its use; thus making it very similar to a pure public good.

20.1.2 *Profitability of research and development*

The public good character of knowledge makes it harder for a firm to reach an acceptable level of profitability. If a firm cannot keep a new innovation secret or if the government does not issue patents, then any competing firm will be able to make use of the new innovation without any costs. This means that the firm that invested in the research does not earn any competitive advantage from this research. It is the problem of any public good that agents can free-ride on each other. The problem is simply, that private agents do not have the incentive to innovate because of the public good feature of knowledge. In order to appropriate any profit from research a firm needs to be sure that competing firms can be prevented from using the new knowledge.

20.1.3 *Externalities*

Jones and Williams (1998) identify important externalities in the production of knowledge.

The first is that scientists use the results of others as input in their own work. A certain innovation or scientific result can have its own value but it can also be utilized by others to make important progress – maybe even in different research branches. For example one can think of the deployment of game theory in biological research (Dawkins, 2006). This shows how knowledge functions as a positive production externality. We call this the *standing-on-shoulders* effect or the spill-over effect.

The second externality that Jones and Williams points to is a duplication externality. The idea is that there might be less than constant returns to scale in research. If we double the amount of researchers but the production of knowledge is not doubled this is due to the researchers producing the same ideas – producing duplicates. The duplication problem is called the *stepping-on-toes* effect for obvious reasons.

The problem of efficient provision of a public good can also be formulated in terms of externalities where a firm's production of knowledge is a positive externality for other firms because they can use this knowledge in their own production.

20.1.4 Efficiency of research and development

The externalities relating to the production of knowledge depends strongly on the level of communication between research units. The standing-on-shoulders effect is only utilized if new knowledge is actually obtained by fellow researchers – that is if the new knowledge is publicly available. The same holds for the stepping-on-toes effect. If researches keep their work secret then the duplications made will rise significantly. On the contrary if researches make their work public this can help minimize the standing-on-toes effect.

20.1.5 Asymmetric or incomplete information

If we assume that the problem of the profitability of research is solved and a firm needs to find financing for a research program then we have a problem of asymmetric information (Hall, 2002). The problem is common to everybody who wants to take out a loan and cannot offer collateral. Assume that there is uncertainty regarding the profitability of a project and that the banks cannot know the probability of success – i.e. the probability that the project will result in new innovations. If the researcher knows this probability then we call it asymmetric information – if the researcher does not know we call it incomplete information. However the results remain the same if it is incomplete or asymmetric information problems. A bank will have to ask for a high interest rate or simply deny the loan if they cannot know the probability of default – we assume that the loan is defaulted if the research project is unsuccessful.

There is also the problem of moral hazard where the bank is unable to monitor the effort made by a researcher. If the probability of success rises with the effort of a researcher, but a high effort is costly for the researcher, then the bank runs the risk that the researcher chooses not to contribute with a high effort. This uncertainty can also discourage the bank from lending without collateral.

20.1.6 Capitalism and research and development

In the description of the nature of research and development we have shown that there are problems of public goods, externalities and information. These are the basic

ingredients for a classic textbook example of an inefficient market – that is an inefficient *capitalistic* market. Without government intervention, a private profit motivated firm will not have sufficient incentive to engage in a research project because of the public good character of knowledge. It is not profitable if a firm spends resources on a scientific project and when it is finished, all competing firms just use the new knowledge.

Private firms furthermore have an incentive to keep research results secret – if competing firms have less knowledge then this is a competitive advantage. The incentive not to communicate knowledge enhances the stepping-on-toes effect while decreasing the standing-on-shoulders effect. The result is that private profit motivated firms create inefficiencies in the production of knowledge.

20.1.7 The problem with patents

To ensure the incentive of private firms to do research, the normal policy of governments is to issue patents. A patent gives a firm or person exclusive rights to use a certain innovation for commercial purposes for a limited amount of time (Hall, 2002). This ensures that the innovating firm can earn monopoly rent because competing firms are not allowed to use the knowledge, thereby making it profitable for private firms to engage in R&D projects.

Obviously patents come with a cost to social welfare. As long as an innovation is patent protected the owner of the innovation will charge monopoly prices, resulting in an inefficient provision of the relevant product. But the idea is that once the patent expires the economy will benefit from the total value of the innovation. If the life time of products in question is short then products currently produced will always be under monopoly provision because of patents. This is true for industries with fast progress in technology – for example computer software (Hall, 2002).

20.2 How patents can inhibit research

A benefit of patents is that firms have to make their research public and thereby contribute to the diffusion of knowledge. However there are also important effects that inhibit the progress in research. Shapiro (2001) argues that problems arise when a new innovation violates patents held by other firms. It follows from the positive production externality in research – the standing-on-shoulders effect – that new research findings

build on prior research. This effect is especially important in the areas of semiconductors, biotechnology and computer software (Shapiro, 2001).

If a new innovation is found to violate patents of other firms then all the firms have to form an agreement before the new innovation can be produced and marketed. If we assume that there are no transaction costs in the economy – a Coasian world – and no strategic interaction then the firms would be able to find the optimal solution by themselves. But if there are transaction costs then collecting licenses is both costly and time-consuming – and if these costs are large enough the firms will be discouraged from investing in research in the first place (Shapiro, 2001).

20.2.1 Strategic interaction and patent licenses

If we introduce strategic interaction and assume that a firm starts acquiring licenses for the new innovation, as it obtains more and more licenses, it will have committed a large fixed cost to the project. This in turn lowers the firm's bargaining power thereby making its efforts less profitable (Shapiro, 2001).

This problem can be made clearer by a mathematical representation of the problem. Assume that the total profit of the new innovation amounts to Π and that this innovation violates patents held by N firms. Further we assume for simplicity that all firms share the profit equally – so we have that the profit for a single firm is given by equation (4):

$$\pi = \frac{\Pi}{N + 1} \quad (4)$$

Now assume that the innovating firm pays for one license at a time – by paying each firm the amount π . When the last patent holder is being introduced to a license contract it will know that the innovating firm will already have committed a large amount of resources – corresponding to $\pi(N - 1)$. Since the contracts for the other patents cannot be retrieved these resources are sunk costs. Now if the last patent holder demands a price for the license equal to the rest of total profits – that is 2π – then the innovating firm has a choice between losing $\pi(N - 1)$ or paying the last patent holder the price of 2π and end up with zero profits. Obviously it is better to get zero profit instead of a loss so the innovating firm has no other choice than to pay the last patent holder a higher price. The reason why the last patent holder can get a larger price is because the

innovating firm has committed large costs to the project – by buying licenses – and in this process it has lost bargaining power (Shapiro, 2001).

A competition can arise amongst patent holders to be the last (or one of the last) to negotiate - since this is the most profitable – thus making it more time-consuming for the innovating firm to obtain all licenses (Shapiro, 2001).

These effects of strategic interaction and patents can deter firms from innovating in the first place. There is a real risk that an innovation which violates several patents is not profitable because acquiring licenses is too costly and time consuming.

If a firm can innovate around existing patents then this problem is not so severe, there is only the inefficiency of having to use resources to innovate around existing knowledge.

20.2.2 Hold-up problem

If a firm has put a new innovation into production only later to find out that this innovation violates one or more patents then we can have the problem of a hold-up. Since the new innovation is already in production and generating profits, a patent holder can claim all (or nearly all) of the proceeds from the new innovation – like a hold-up. This problem makes the innovative industries a mine field (Shapiro, 2001). The risk that a product violates some patent and therefore is worthless to the innovator will decrease the profitability of research and thus deter firms from investing in R&D.

20.2.3 Summary of the problems with patents

The hold-up problem and the costs of acquiring licenses make it very hard for firms to make a profit by investing in R&D. These problems are direct effects from the introduction of patents and show how hard it is to create incentives for private firms to invest in research. This does not mean that governments should stop issuing patents. Patents do give private firms an incentive to invest – and there is indeed important research conducted in private firms today. However the description we offer above show that there are unsolved problems that inhibit an efficient use and production of knowledge.

20.2.4 Prizes as an alternative

Besides patents, a government can also issue a monetary prize which is given to a person or a firm if a certain innovation is presented (Hall, 2002). The idea is that once

the innovation is presented the government gets a patent and the monetary prize is sufficient to ensure a private incentive. The problem is that the government has to decide upon which innovations is to be made or which innovations it should issue a prize for. Also the government has to decide how big the prizes should be for each innovation.

These two problems make prizes inappropriate as a complete alternative to patents. Prizes may be suitable for very specific innovations but will not solve the larger problem of ensuring incentives to innovate (Hall, 2002).

20.2.5 Government research units as an alternative

If research was conducted by government research units instead of private firms then this would increase both the amount and efficiency of R&D. Government institutions would not be profit motivated so the public good nature of knowledge is no problem. On the contrary public institutions are the only ones with the incentive to maintain an efficient supply of a public good. This means that there does not have to be patents or other forms of intellectual property rights to ensure the incentives for a government to invest.

Furthermore because government institutions do not have any incentive to be secretive and withhold research findings this ensures that the standing-on-shoulders effect is exploited to the fullest and that the negative stepping-on-toes effect will be minimized, hence resulting in a more efficient production of knowledge.

If research is conducted by government research units instead of private firms then there will be more resources invested and the efficiency of these resources is enhanced.

20.2.6 Will there be any incentives to innovate without the profit motive?

One could ask whether there would be any incentives to innovate without the profit motive. A question like this presupposes that the profit motive is beneficial for incentives to innovate. However, we have shown above that because of the public good nature of knowledge, the profit motive is actually an impediment for incentives to innovate.

Also the question of incentives and profit motive presupposes that the profit from research goes to the researcher. This is only the case if the researcher is also the owner

of the firm. Whenever the researcher is hired by a firm, her incentives to innovate depend on the contract she has made with the firm. A government research unit can offer similar contracts thus resulting in the same incentives for the individual researcher.

That researchers are to a large extent hired workers is in line with the argument about information asymmetries and moral hazard. If it is hard to convince banks to lend you money to finance a research project then most projects will be financed by institutions that need no external financing – like a large firm.

20.3 Research in a planned economy

Thus far we have argued that research is much more efficiently conducted by government institutions. This can be implemented within a capitalist economy; however there are reasons why firms should be publicly owned in order to ensure an optimal production of knowledge. The first is that it is easier to finance and the second is that there might be firm specific knowledge that is an important input in the research production.

20.3.1 Financing research

Let us first address the question of financing research. Just because the overall societal return on research investment is high does not mean that it is easy for the government to attain the funds needed. If we finance government research units in a capitalist economy – that is with all other production being carried out by private enterprise – then we have to use taxes. Now there are some limits to how much taxes the government can collect without creating annoyances amongst the general public.

Taxing labour too hard has adverse welfare effects because workers might work less or simply leave the country. If firms are taxed too hard this makes them less competitive than foreign firms and they could also leave the country. Also the knowledge produced by a government research unit will be available to both domestic and foreign firms. But a country can only tax its domestic firms – this problem creates some difficulties.

In a planned economy it would be possible to finance research directly from the sales of production. The financing would be taken directly from firm profit. This is an important new way of financing public expenditure that becomes available in a planned economy.

There is no risk that a firm would move to another country – because it is democratically controlled. The public firm has incentives similar to those of a government and it therefore does not have a problem with public goods or externalities.

20.3.2 *Firm specific knowledge*

If there is specific knowledge only known by people within a firm and this knowledge constitutes an important input for researchers. Then this information would be hard to attain if production and research is divided between government and private enterprise. The firm specific knowledge could concern details of the demand for goods or consumer feedback – knowledge that can only be attained by a person within the firm. If this information is sensitive to the firm – meaning that it does not want competing firms to have this information - then we cannot expect that it would share the knowledge with government institutions either. The problem could be solved if the government paid for the researchers and placed them in private firms. But this solution is highly problematic because the researchers would not be allowed to exchange information. Further we have a problem of determining which firms are to get free researchers from the government.

In a planned economy firms have all the needed incentives to share important information and finance research.

20.3.3 *Accidental innovations*

The exposition above illustrates how a planned economy will deliver better results when research is understood as an intentional effort to produce new knowledge – that is when research depends on investments in R&D. However, new innovations can also be discovered by accident and then we need to ask which economic system is most beneficial.

To analyze this question we can assume that there is a certain probability for a single firm to discover a new idea. If we assume that the probability of a discovery increases with time then the probability can be given by a Poisson distribution, see equation (5).

$$P_i(1|\lambda_i) = \frac{\lambda_i}{1} e^{-\lambda_i} = \lambda_i e^{-\lambda_i} \quad (5)$$

Equation (5) is the probability mass function for the Poisson distribution. It gives the probability of one innovation given λ_i , which is the expected number of innovations during a certain period of time.

Now if a firm is lucky and discovers an innovation then it will keep this information secret as long as it can. This inhibits the dissipation of new knowledge and lowers the value of the innovation – but it is optimal for the private firm. In a planned economy firms do not need to be secretive and this means that firms can be ordered to share new knowledge.

We can think of a situation in which a new innovation can be spread to the whole economy in capitalistic society. If the lucky innovator makes such a large profit that it is able to buy out other firms then the new innovation will be used to a much larger extent. This comes at a cost however. If we assume that the probability of discovering a new innovation follows equation (5) for each firm, then the total expected probability of there being any innovations in the economy is given by equation (6):

$$\Lambda = \sum_0^N (\lambda_i) \quad (6)$$

Where N is the number of firms in the economy, if we assume for simplicity that every firm has the same probability of discovering – same λ – then the total expected probability of innovations is given by equation (7).

$$\Lambda = N \cdot \lambda \quad (7)$$

Equation (7) simply says that the expectation for an innovation occurring within a certain period of time is positively dependent on the number of firms in the economy. Now if a private firm in a capitalistic economy is lucky and discovers a profitable innovation, and moreover, is able to buy out competitors then the diffusion of the new innovation is increased. But because there now are fewer firms in the economy, the overall probability of a new discovery has fallen.

This argument hinges on the assumption that a large firm cannot divide its production into smaller units in order to benefit from future innovations. It is assumed that a planned economy can divide production into autonomous production units that share

knowledge and optimizes the expected rate of innovation. If the same assumption is made for a large company then the two economic systems will perform equally well.

20.3.4 Summary of R&D

We have shown that the public good nature of knowledge makes it difficult for private firms to appropriate enough profits to make investments in R&D profitable. Also the incentive for a private firm to withhold information from competing firms hinders the efficient production of knowledge because it increases the negative stepping-on-toes effect and decreases the positive standing-on-shoulders effect.

To ensure a private incentive to conduct research the government can issue patents. There is a social welfare loss from issuing patents because a patent protected innovation will be supplied by a monopolist. This effect is greater if the life time of particular products is short.

Also patents do not guarantee an incentive to invest in R&D. If new innovations violate existing patents – which would follow the standing-on-shoulders effect – then it can be so costly to retrieve licenses that R&D investments cease to be profitable. Transactions costs created by strategic interaction of license holders and hold-up problems can make it very costly to retrieve licenses.

Government firms do not have problems with public goods – because they are not profit motivated and for the same reason they have all the incentives to share information. This makes R&D investments in government units more efficient – still within a capitalist economy.

In a planned economy, research investments would be even more efficient, because it is easier to finance public spending through firm profit than through taxes and because researchers would have access to firm specific knowledge.

21 COST MINIMIZING

We suspect that most people believe that the capitalist economic structure creates the best incentive for firms to minimize costs. For instance, Roemer was worried that publicly owned firm would only be facing a soft budget constraint – the concept that the firm would be bailed out if it was grossly inefficient and ran large losses. However

whether or not to bail out failed firms is a political choice; a planned economy can easily decide not to bail out firms, and the firm managers in a planned economy would then be faced with an equally hard budget constraint.

In so far as cost minimizing is understood as innovations that come about through an intentional effort, then the presentation above shows that a planned economy will produce more cost efficient firms. If cost minimizing depends on a structured innovative effort then planning is the better economic system.

If cost minimizing depends on accidental discovery of information, then a planned economy is better whenever an innovating firm does not succeed in expanding and thereby ensuring that the new innovation is more widely used in the economy.

If cost minimizing is understood as depending on decisions made on the firm level then the incentives can indeed be higher for a private enterprise under certain assumptions. Specifically the following three assumptions:

1. The owner of the private firm is directly involved in specific decision making.
2. The owner has the necessary cognitive abilities to make decisions that will minimize costs.
3. There are no externalities

If one of these assumptions do not hold then private firms cannot be assumed more cost efficient than government firms.

That assumption number two is necessary is obvious – an inept manager cannot be assumed to minimize costs. If assumption number one does not hold then we have a principal-agent problem, and the problems of making the agent behave optimally are the same for a private principal and a government principal.

If the third assumption – no externalities – is violated then the cost minimizing behaviour of one firm can increase the costs of other firms or persons in the economy. If a firm lowers its costs by imposing an externality on other agents then the net result will be zero or even negative. Therefore we have to assume no externalities to ensure that the cost minimizing behaviour of private firms results in cost efficient production on a macroeconomic level.

It is not realistic to assume that all three assumptions, needed in order for a capitalist economy to be more cost efficient than a planned economy, will be true at the same time. Principal-agent problems that arise when the owner of a firm does not control the day to day management are vast in the economy. And while it is realistic that a capitalist can have the necessary cognitive abilities to minimize costs, it is highly unlikely to find an economy without externalities. To argue that there exist industries where firms cannot gain an advantage by imposing costs on each other is far-fetched. At least firms will impose the costs from pollution on the general public.

This exposition shows that one should not assume that private firms necessarily are more cost efficient than government firms. The next question we will ask is whether there are any reasons to believe that a private firm will be less cost efficient.

21.1 Wasteful spending

If firms spend resources on acquiring market shares from each other then this will constitute wasteful spending on a macroeconomic level. If the revenue of one firm increases at the expense of a competing firm then the net benefit for social welfare is zero. If the firm endured a cost to acquire the extra revenue then there is a social welfare loss.

Assume that firms can acquire market shares from each other by spending on an investment good – think of advertising or industrial espionage – then firms will have an incentive to do this. The result is that the profit motive compels firms to spend resources on a wasteful investment good.

This problem can be illustrated by a simple model. Assume that there are two monopolistic firms producing close substitutes. The two firms face each their demand curve, given in equation (8)

$$D_i(p_i) = m_i - p_i, \quad i \in \{1; 2\} \quad (8)$$

Equation (8) is a standard linear demand curve. Assume that the consumers who are interested in the products of the two firms have a fixed budget $M = m_1 + m_2$. Where m_1 is consumers' budget on products from firm 1 and m_2 likewise for firm 2.

The important part of the model is that firms can acquire a higher share of the market by investing in advertising. If we denote advertising spending as A_i , the consumers' budget for each firm is given by equation (9):

$$\begin{aligned}
 m_i &= m_i(A_i, A_j), & i, j \in \{1; 2\}, i \neq j \\
 \frac{\partial m_i}{\partial A_i} &> 0, & \frac{\partial m_i}{\partial A_j} < 0 \\
 \frac{\partial^2 m_i}{\partial A_i^2} &< 0, & \frac{\partial^2 m_i}{\partial A_j^2} < 0
 \end{aligned} \tag{9}$$

This equation says that demand rises when the firm invest in advertising and that this effect is decreasing. Also demand falls with the advertising spending of the competing firm – this effect is also decreasing.

Combining equation (8) and equation (9) gives the demand curve facing each firm. The demand curve is given by equation (10).

$$D_i(p_i) = m_i(A_i, A_j) - p_i, \quad i, j \in \{1; 2\}, i \neq j \tag{10}$$

With this specification of the demand function we can write the profit maximizing problem facing a firm as given by equation (11):

$$\max_{p_i, A_i} \pi_i = [p_i - c_p][m_i(A_i, A_j) - p_i] - A_i \cdot c_A, \quad i, j \in \{1; 2\}, i \neq j \tag{11}$$

This equation says that the monopolist will maximize profits by choosing a price and a level of advertising. For simplicity, assume constant marginal costs of production c_p and constant marginal costs of advertising c_A .

We can interpret the model as having two stages. First firms decide upon an amount to spend on advertising, this gives the size of their respective market shares. Next each firm chooses the price that maximizes profits.

The optimal level of advertising is given by the first order condition in equation (12) :

$$[p_i - c_p]m'(A_i, A_j) = c_A \tag{12}$$

This shows that it is optimal for a firm to invest in advertising up until the marginal benefit is equal to the marginal cost. Each firm will choose an optimal level of advertising by using equation (12).

If we assume that the two firms have a symmetrical cost structure and that the demand $m_i(A_i, A_j)$ depends symmetrically on A_i and A_j then each firm will choose the same level of advertising – because they will be facing the problem.

Equation (12) states that the optimal level of advertising is found by equating the marginal effect on revenue with the marginal costs of advertising. For our purpose it is enough to notice that the level of optimal advertising is positive and because of symmetry this will have no effect for the demand of either firm. Also in this particular model advertising has no effect on the price for the consumer – this is perhaps a bit unrealistic. The conclusion, however, is not unrealistic. The firms will spend a positive amount on advertising trying to acquire market shares from each other. Despite their efforts both firms end up with the same market shares and the resources spent on advertising constitute a waste for society as a whole.

With this model we have shown that private firms can have an incentive to conduct wasteful spending. Government firms will not have the same incentives to get market shares from each other. In so far as public officials are aware of the problem, they will see that the firms are only hurting each other with their wasteful spending. They will rightfully perceive it as an externality and internalize it properly.

21.2 Conclusion on cost minimizing

We have shown that the assumptions one needs to make, in order for private firms to be superior at cost minimizing compared to a government firm, are unrealistic. Further we have shown that it is reasonable to assume that government firms will be more cost efficient because private firms have an incentive to waste resources on trying to capture market shares from each other.

22 ECONOMIES OF SCALE

This section will analyze how well capitalistic and planned economies take advantage of the opportunities offered by economies of scale. Economies of scale can broadly be

thought of as properties of the productive technology – in the sense that a higher utilisation of scale economics gives a higher production for the same factor input. Thus in the framework of economic growth, economies of scale enters into total factor productivity (TFP).

Firstly we define economies of scale as a concept. This introduction is deemed necessary to make it explicit exactly what we mean by economies of scale. *Secondly* the effect of economies of scale within a capitalistic economy will be analyzed and *finally*, where applicable, the same issues will be analyzed within a planned economy.

22.1 Taxonomy of economies of scale

The idea that output can be made to increase disproportionately compared to an increase in input is neither complex nor new. The division of labour, Adam Smith's famous description of how efficiency is greater when the production process is split into specialized sub-processes and distributed amongst specialized craftsmen, is exactly such an example of economies of scale (A. Smith, 1998).

While many have an intuitive idea of what is meant by economies of scale it seems fruitful to start out with a clear-cut definition of what constitutes economies of scale.

To understand what constitutes economies of scale three different cases must be considered: productions with decreasing, constant or increasing returns to scale. Each of these has different consequences on the optimal size of a productive unit. Note that one must discern between the size of productive units and firm size; a firm may very well encompass several productive units.

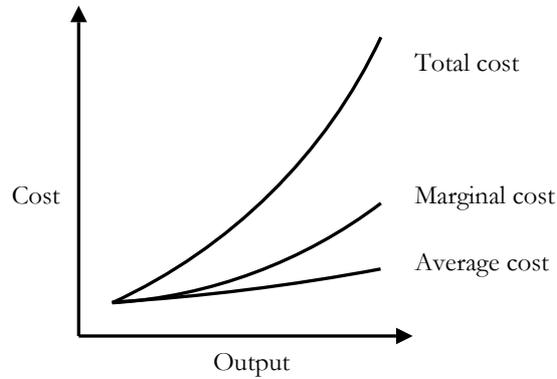
22.1.1 Diseconomies of scale

The first concept to consider is one that many never think of when considering economies of scale; that efficiency may also decrease with larger firm or organization size.

Diseconomies of scale are the situation when there are decreasing returns to scale and an increase of output requires a disproportionately larger increase in input. This means that when you double all factor inputs, production is less than doubled. Under decreasing return to scale total, marginal and average costs are increasing with the level of output, *cf. figure 5*. With decreasing return to scale a minimization of productive unit

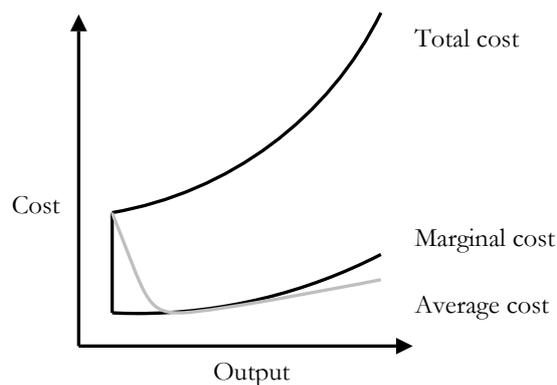
size is optimal. Note that this does not equate small organizations but rather that a “division of labour” in this case is counterproductive.

Figure 5. Decreasing returns to scale



In an industry with decreasing returns but also with fixed set-up costs, total costs grow monotonically and, apart from the initial unit, marginal costs are also increasing. However, due to the fixed set-up costs, average costs decrease until being equal to marginal costs and are thereafter increasing. This gives rise to a situation as depicted in *figure 6*. In this case, even though there are decreasing returns the optimal productive unit size is positive.

Figure 6. Decreasing returns to scale and setup costs



The consequence of decreasing returns and fixed setup costs is, that when total costs reaches a level where splitting production into two units will be profitable, a new productive unit will be set up.

Mankiw & Whinston (1986) demonstrate, using a Cournot-model of strategic interaction that given the presence of fixed setup costs and decreasing returns, the

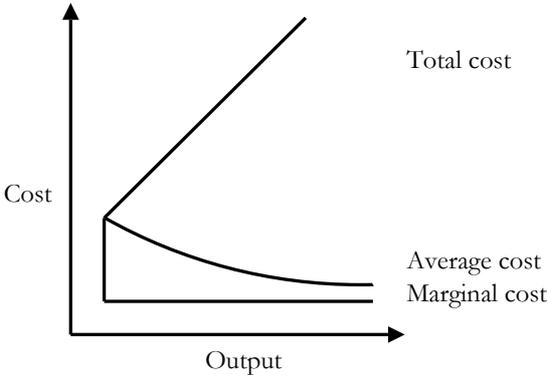
market equilibrium will have a bias towards entry; the market equilibrium will in this case yield a socially excessive amount of entry and there will therefore be too many firms.

22.1.2 *Constant returns to scale*

With constant returns to scale, firm size becomes largely irrelevant as doubling the inputs leads to double the output. Total cost grows linearly and both average and marginal cost are equal to the same constant. Under constant return to scale there is no optimal productive unit size; a thousand firms producing just one unit each is as efficient as one large firm producing a thousand units.

Constant returns to scales coupled with setup costs do however give rise to economies of scale. When there are setup costs the average cost of production will drop with increased output, *c.f. figure 7*. In this case it is optimal to consolidate production into one productive unit.

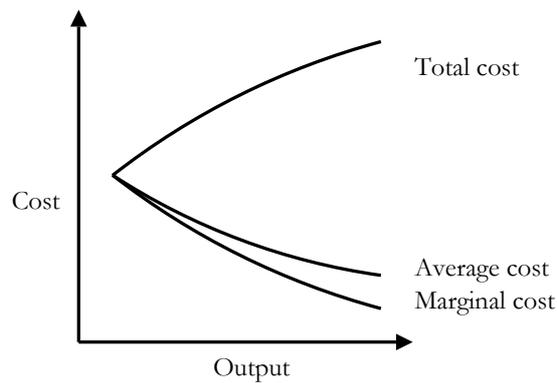
Figure 7. Constant returns to scale and fixed setup costs



22.1.3 *Increasing returns to scale*

When there are increasing returns to scale then an increase of output requires a proportionally smaller increase in input. Total cost are therefore monotonically increasing and both average and marginal costs are decreasing, *c.f. figure 8*.

Figure 8. Increasing returns to scale



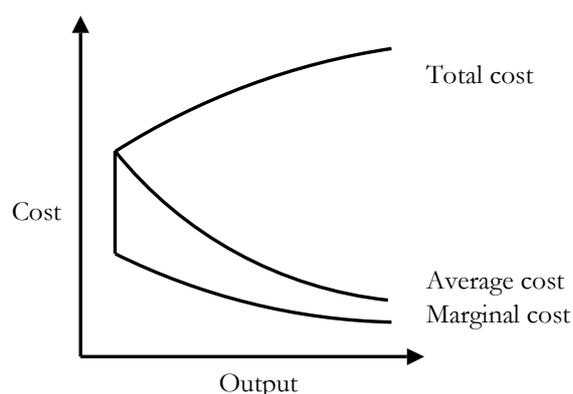
Increased returns are thus a result of the productive technology employed, a prime case is learning by doing, here efficiency rises with the size of production (Fudenberg & Tirole, 1983).

Another way to consider increasing returns is to think of productive technology as depending on the scale of production. In this case the productive technology employed changes with output; a convenient way to think of this is the division of labour (A. Smith, 1998). To use Adam Smith's example, when demand and production is very small the most efficient organization may well be if only one person does all tasks. If demand and therefore production is larger efficiency may be higher if tasks are shared amongst a couple of persons and if production is even larger it can be even more efficient to split production up into small specialized sub-processes assigned to different individuals.

One example of increasing returns is the production of technologically very advanced consumer goods. Think of how the price of computing equipment falls as firms achieve know-how and proficiency with their production processes.

If there are increasing returns it is therefore optimal to consolidate production into one productive unit; given the presence of setup costs it just becomes even more optimal to do so, *c.f. figure 9*.

Figure 9. Increasing returns to scale and fixed setup costs



It is obvious that the cost structure has a large impact on optimal industry composition. As was illustrated above, the simple yet plausible assumption, that to set up a productive unit some fixed costs will be incurred, drastically changes conclusions on optimal productive unit size. In real life the fixed costs can be thought of as the costs incurred when buying a factory building, or equipping a production line with machinery.

For the further analysis references to economies of scale will be references to productive technologies which have decreasing average cost; i.e. to technologies where per unit costs falls with the size of production. It will however be helpful to remember that the per-unit efficiency improvements increase much faster under increasing returns to scale than under constant returns to scale.

Even though a graphical analysis is inherently simple it allows for immediate understanding of what constitutes optimal productive unit size under the different assumed cost structures. The graphs also provide information on what cases warrant further analysis. However despite their usefulness in determining optimal size the graphs do not say anything about possible market equilibriums – to establish that, assumptions on both cost and demand structures must be made.

The next sections will investigate how the presence of economies of scale affects welfare. The analysis will be augmented by a model of how industry composition is affected by strategic interaction and the presence of fixed setup costs.

22.2 Welfare effects arising from economies of scale

With the presence of economies of scale there is a clear efficiency bias towards aggregating production into just one or a few productive units. While the optimality of

aggregating production is clear from a social planner's point of view there is much doubt about the market's ability to achieve the social optimum.

If the setup costs are large enough for the economy to end up with a sole firm producing the good in question the firm will have the necessary market power to extract monopoly profit, which will have the consequence that there will be produced socially deficient quantities for the given productive technology. To avoid monopoly profits and market power in general, classical economic analysis usually assumes a large number of small firms competing prices down towards marginal cost. The presence of either setup costs or increasing returns can however act as a rationing mechanism and can greatly limit the number of firms in an industry.

Under the presence of sufficiently large fixed setup costs relative to market size it is obvious that there is an upper limit to the number of firms that can profitably enter a market with such entry barriers.

22.3 Welfare effects of fixed setup costs and strategic interaction

When there are economies of scale it is welfare maximizing to concentrate production to one firm only – however a private firm will in such a situation use its monopoly power. This leads to too low a production at too high prices. If the monopoly rents are large enough this will give competing firms an incentive to enter into the market – this will result in lower prices but also a lower utilizing of economies of scale. In other words; under capitalism there is a trade-off between utilizing the efficiency gains from economies of scale and the welfare losses associated with monopoly and oligopoly rents.

In a simple and highly stylized model, the welfare consequences of fixed setup costs and perfect competition will be analyzed. The analysis of competitive behaviour is made in a two stage game which models the strategic interactions of firms as quantity setters. In stage one the firm chooses to enter or not to enter. In stage two the firms choose their quantities.

In other words the welfare consequences arising from fixed costs and free entry will be analyzed within a Cournot framework inspired by Tirole (1988, pp. 218-220).

22.3.1 The model

Consider an industry with n symmetric firms competing in a market. The profit of the representative firm j is given by *equation (13)*.

$$\Pi(q_j) = q_j P(Q) - c_j(q_j) - f \quad (13)$$

Where $Q = q_j + q_{-j}$ is the quantity q_j chosen by the representative firm j and the quantity q_{-j} which is the sum of quantities chosen by all other firms. $P(Q)$ is the market clearing price given the aggregate production. The fixed setup cost is represented by f where $f > 0$ and must be incurred by every firm choosing a quantity above zero.

22.3.2 Firm's strategic behaviour

Since firms set quantities in a Cournot model, firm j will set its optimal quantity given the quantity chosen by all other firms. Thus for the representative firm j the reaction curve to the quantities set by other firms will be given by *equation(14)*.

$$q_j = R_j(q_{-j}) \quad (14)$$

Note that since firms are assumed symmetrical both the reaction curve and therefore the quantity chosen will be the same for all firms.

22.3.3 Firm's profit maximization problem

In its effort towards maximizing profit, given the quantity chosen by all other firms, the representative firm solves $\partial \Pi_j'(R_j(q_j), q_{-j})/\partial q_j = 0$. Applying this to *equation (13)* thereby yields the first order condition for profit maximization *equation (15)*

$$\frac{\partial \Pi(q_j)}{\partial q_j} = P(Q) - c'(q_j) + q_j P'(Q) = 0 \quad (15)$$

The first two terms are the profitability of the additional quantity produced, i.e. the difference between price and marginal costs. The last term is the carry-on effect on intramarginal units, i.e. the effect that an additional unit produced will lead to a lower price on all units produced (Tirole, 1988). The fixed setup costs which must be incurred by firms have however no effect on the equilibrium; the fixed costs will therefore only have the effect that it reduces profitability of the firms.

22.3.4 Goods demand

To simplify inference both the demand side and the cost structure, $c_j(q_j)$, is assumed linear. Demand is thus assumed to be a linear function of price and is given by *equation (16)*.

$$D(p) = m - p \quad (16)$$

In the determinacy of goods demanded m is the budget constraint. Let aggregate production equate demand and the market clearing price as a function of total production will then be given by the following *equation (17)*, the inverse demand function:

$$p(q_j, q_{-j}) = m - Q = m - q_j - q_{-j} \quad (17)$$

22.3.5 Firm's cost structure

Let the representative firm j 's cost function be linear in quantity produced and be given by *equation (18)*

$$c_j(q_j) = cq_j \quad (18)$$

Specifying the productive technology as in *equation (18)* assumes constant returns to scale. Thus with both fixed costs and constant returns to scale the case analyzed correspond to 'economies of scale' in the taxonomy.

22.3.6 Equilibrium quantities

The equilibrium quantities can be calculated by differentiating *equation (17)* and *equation (18)* with respect to q_j and inserting $p'(q_j, q_{-j})$ and $c'_j(q_j)$ into *equation (15)* and solving for q_j . This yields *equation (19)* which is the profit maximizing quantity for the representative firm j given the assumed demand and cost structures.

$$q_j = R_j(q_{-j}) = \frac{m - q_{-j} - c}{2} \quad (19)$$

Since the firms are assumed identical, q_{-j} can be expressed as $(n - 1)q_j = (n - 1)q$ inserting this into *equation (19)* and solving for q yields the per-firm equilibrium quantity, *c.f. equation (20)*.

$$q^* = \frac{m - c}{1 + n} \quad (20)$$

By symmetry of individual firms the total industry output is then given by equation (20) multiplied by number of firms in the industry, *c.f. equation (21)*

$$Q^* = \frac{m - c}{1 + n} n \quad (21)$$

Inserting the industry equilibrium output into equation (17) then yields the price, *c.f. equation (22)*

$$P^* = \frac{m + cn}{1 + n} \quad (22)$$

It is noteworthy that up to this point the fixed setup costs have nowhere had an impact on the equilibrium values. This of course follows from the setup cost being invariant and thus independent from the quantity produced.

Where the fixed costs do matter is in firm profitability, and in determining the number of firms, that the industry will profitably support. Inserting equation (20) and equation (22) into equation (13) yields the per firm profit, *cf. equation (23)*.

$$\Pi(q^*) = \frac{(m - c)^2}{(1 + n)^2} - f \quad (23)$$

22.3.7 *Equilibrium number of firms*

To determine the equilibrium number of firms in the industry, assume that there will be entry as long as firms stand to make positive profit – as long as equation (23) is greater than or equal to zero. Note that this assumption, if setup costs are absent, is equal to assuming an unlimited number of firms and thereby perfectly competitive behaviour.

Let equation (23) be equal to zero and solve for n to get the equilibrium number of firms in the industry, *c.f. equation(24)*.

$$n^* = \frac{m - c}{\sqrt{f}} - 1 \quad (24)$$

Note that this assumes entry until firms make zero profit; for n being large an additional firm will only be a small increment, and thus following Dixit and Stiglitz's (1977) lead from a similar analysis it will be assumed that the marginal firm will be just breaking even.

The optimal number of firms, n^* , arising from equation (24) is a continuous variable where it ideally should be an integer; for these calculations treating the number of firms as continuous is a benign assumption – the assumption becomes important in the comparison with the planning solution. At that point we will restrict the number of firms to be either zero or greater than or equal to one. The main point of contention is that the model can lead to entry of firms such that $n^* \in]0; 1[$, i.e. for instance entry of a half firm. In the comparison with the social planner's solution it will be assumed that $n^* = 0$ until the first firm can just break even and thus $n^* = 1$.

22.3.8 *The market solution and the planner's solution*

Thus with all the building blocks prepared, the industry equilibrium output can be further simplified by inserting equation (24) into equation (21) and rearranging terms. This gives *equation (25)*.

$$\hat{Q}^* = m - c - \sqrt{f} \quad (25)$$

Equation (25) is the best case outcome in a capitalistic market process, and is therefore an excellent point of comparison with how a social planner would utilize the same productive technology.

The first best outcome is attained by setting prices equal to marginal costs. In this case marginal costs is simply c and inserting $p = c$ into equation (16) gives the first best quantity produced, *c.f. equation (26)*

$$Q^{1st} = m - c \quad (26)$$

Comparing equation (25) with equation (26) immediately reveals that $Q^{1st} > \hat{Q}^*$ however, arguably, this is cheating. The social planner must also incur the fixed cost and this is nowhere to be found in equation (26).

Thus a more realistic and 'fair' basis for comparison arises by setting prices equal to average costs, *c.f.* equation (27).

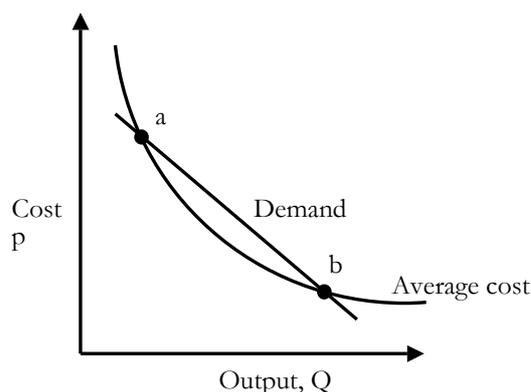
$$p^{2nd} = \frac{cq + f}{q} = c + \frac{f}{q} \quad (27)$$

Inserting equation (27) into equation (16) gives the second best quantity as a second-order polynomial given in equation (28)

$$q^2 - (m - c)q - f = 0 \quad (28)$$

The second best solution will have one or two valid roots depending on specific assumptions about the budget, the slope of the demand curve and the productive technology, *cf.* Figure 10.

Figure 10. Average cost equilibriums



If there are two solutions to equation (28) we will assume that the planner is able to discern the two solutions and choose the solution with a higher total output – corresponding to point b in Figure 10.

Solving equation (28) for q yields the second best quantity; Q^{2nd} given by equation (29).

$$Q^{2nd} = \frac{(m - c) + \sqrt{(m - c)^2 - 4f}}{2}, \quad \forall m \geq 2\sqrt{f} + c \quad (29)$$

The second best solution only exists for $m \geq 2\sqrt{f} + c$. In other words, the consumer's budget must be sufficiently large for production to be beneficial, otherwise average cost will at all times be above what consumers are willing to pay.

While it is not completely obvious from inspecting equation (25) and equation (29), it holds for all values of m that $Q^{2nd} \geq \hat{Q}^*$, which means that the social planner pricing to average cost, at all times will yield a solution which is at least as good as the market equilibrium under strategic interaction.

The quantities obtained under the different pricing regimes, ordered after the size of total output is shown in Table 3.

Table 3. Comparison of equilibrium quantities

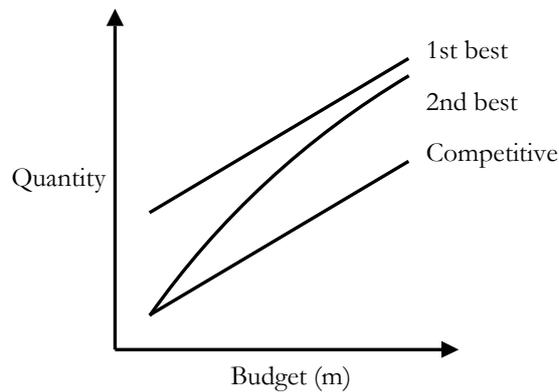
1. Price equal to marginal cost	$Q^{1st} = m - c$
2. Price equal to average cost	$Q^{2nd} = \frac{(m - c) \pm \sqrt{(m - c)^2 - 4f}}{2}$
3. Market equilibrium	$\hat{Q}^* = m - c - \sqrt{f}$

A better illustration of how the pricing regimes relate can be obtained by graphing the quantities for either fixed setup costs and varying budget constraint or fixed budget constraint but varying setup costs.

Under fixed setup costs and for constant marginal costs both the first best solution and the competitive solution grow linearly with the size of consumers' budgets; the only difference is that the competitive solution is translated downwards by \sqrt{f} , c.f. table 3.

When consumers' budget – m – is small the planner's second best solution is the same as the market solution; this however is a very special case as it corresponds to only producing one unit. As consumers' budgets grow larger the second best solution converges towards the first best solution, cf. Figure 11. The reason for this is that when the consumers' budgets increase the social planner will be able to take fuller advantage of the efficiencies arising from economies of scale. In the market solution the case will instead be that when the budget has increased sufficiently there will be entry from a new firm and thus waste resources on incurring the fixed setup costs.

Figure 11. Output for fixed setup cost and variable budget constraint



22.3.9 *The importance of economies of scale*

The previous section proved that given the existence of fixed setup costs the market equilibrium has a tendency to yield too much entry.

This insight, however, is not new:

“It is well known that the unmodified market mechanism fails to solve optimal allocation problems, if non-decreasing returns to scale play a very important role in the economy.” (Aoki, 1971, p. 273)

The important point illustrated by the previous section is that the planner can remove a problem introduced by capitalism. The way this is done is simple. Under planning the profit motive is removed and plant management instead follow another behavioural rule; in the case above we assumed that the planner dictates the firm manager to set prices equal to average costs. A host of other different behavioural rules are possible; the important point is that the number of firms is limited to the socially optimal level – in the case with decreasing returns and setup costs it may well be optimal to have more than one productive unit, yet even in this case the market equilibrium yields a socially suboptimal number of firms (Mankiw & Whinston, 1986).

If the firms instead form cartels to try and extract monopoly profits the result is a double-whammy of social inefficiency. Not only will the price and production now be set to the monopoly – and thus socially suboptimal – level, but there will also be entry until all monopoly rents are dissipated (Mankiw & Whinston, 1986). Thus with setup costs and industrial cartels there will be an inefficient number of firms *and* an inefficient level of production.

22.3.10 Corollary: Economies of scale and consumer choice

Something that has been completely omitted from the discussion above is product differentiation – or more commonly the consumer’s choice between different yet not entirely dissimilar products. However it is an oft heralded virtue of capitalism that it is better at ensuring consumer choice, so how does a consumer preference for product diversity affect the analysis above?

It turns out that the results change very little if at all. In a model of monopolistic competition where firms are faced with fixed setup costs and have decreasing returns to scale production technologies, Koenker & Perry (1981) demonstrate that there will likely be socially excessive entry even when there is a consumer preference for product diversity. For product diversity to be insufficient, consumer preference for diversity must therefore clearly outweigh any benefits from exploiting economies of scale. Mankiw & Whinston (1986) further illustrate that under other assumptions the business stealing effect – the profitability of entry – often dominates the socially optimal number of firms even when agents have a preference for product diversity. In such circumstances the market equilibrium number of firms will be socially excessive.

22.4 Summary of capitalism and economies of scale

With the simple model above we have shown that there is a trade-off between efficient utilization of economies of scale and market power in a capitalistic market. The profit motive leads either to entry of too many firms – and the inability to exploit economies of scale – or too high prices and inefficient provision caused by private firms abusing their market power.

We further illustrated, that a planned economy can take advantage of economies of scale by restricting the number of firms and pricing to average costs. Doing so yields an output that at all times equals or exceeds the market equilibrium.

If we recall the discussion of what factors contribute to economic growth then the results of this section is damaging for the prospects of capitalism. We illustrated that under capitalism firms will either exploit their market power or steal business from one and another. The effect of both scenarios is the same, a socially suboptimal level of production. In the growth scenario, the wider implications of this insight is clear, by choosing the social institution of capitalism we also forgo possible riches.

23 CAPITALISM AND WORK-LIFE BALANCE

In this section we will investigate the connection between capitalism, planning and labour. Labour, and the quality of labour, enters the growth accounting model twice. Once as a direct factor but also as a part of TFP since the social or human capital accumulated will also have an impact on growth.

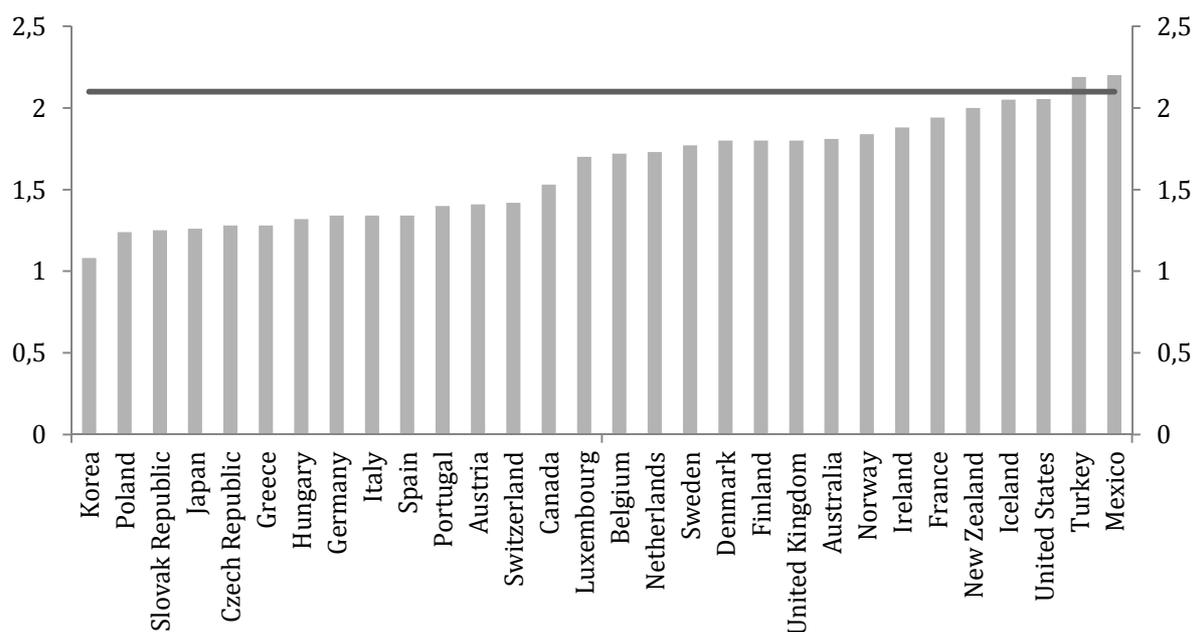
Higher human capital means that the labourers have a higher level of ability and education. Baier, Dwyer, & Tamura (2006) find that human capital constitutes a significant part of TFP. Social capital can be understood as the social cohesion and the level of trust in an economy. A higher level of trust can reduce transactions costs and thereby increase the efficiency of the economy (Leilund & Sousa, 2006). Empirical studies show that the level trust and social cohesion affects economic efficiency and therefore is part of total factor productivity, see Leilund & Sousa (2006) for a survey of empirical and theoretical arguments.

The focus of this section is therefore twofold. Firstly how well do the economic systems ensure an efficient provision of children and secondly how well will the economic structures ensure that the quality of children is optimal. Both issues derive from a very classical economic problem: the trade-off inherent in the problem of allocating time between labour and leisure.

In the first part of this section, we will explore whether the structures of a capitalistic society has any impact on fertility. One inspiration for investigating this issue is the very low fertility rate experienced in many western European countries, cf. figure 12.

It is immediately evident that most OECD countries experience fertility rates markedly below 2.1 births per woman which is the population replacement fertility rate in developed countries (Espenshade, Guzman, & Westoff, 2003). One does not need a vivid imagination to see that a fertility rate that leads to a declining population can, over time, have severe economic consequences. The question to ask is then, is there something systemic about these countries that leads to such a low fertility? This will be the focus of the first part of this section.

Figure 12. OECD fertility rate and population replacement fertility, 2005



Note: Horizontal line indicates population replacement fertility in developed countries, approximately equal to 2.1 birth per woman (Espenshade et al., 2003).

Source: OECD.

In the second part of the section, we will explore how the unrestrained market equilibrium can affect the allocation of time between career and child-rearing.

23.1 The economic importance of children for society

Modern societies have changed from a system where old-age security was supplied directly by family members, towards one where old-age security and other welfare benefits are socialized. This change in how society provides security for its members, however, has not lead to social security being independent of the children. Quite the contrary, current generations support the elderly living today, and it is the coming generations that will support the young people living today. Seen collectively society are just as dependent on its children as families have historically been (Burggraf, 1993). Since society is just as dependent as always on the children to support their elders the persistence of sub-replacement fertility is truly worrying and it seems prudent to ask whether there is something in the structures of society that are reinforcing this effect.

23.1.1 *Children are a public good*

When both welfare and security are socialized the otherwise private good nature of children metamorphose into being, essentially, a public good (Folbre, 1994). Since the

economic science has evidence a-plenty with regards to the tragedy of the commons, we may rightly ask whether this transformation affects society's ability to sustain itself.

When children are considered a public good, parents who choose to have children exert a positive externality on everybody, whereas people who choose not to have children, free-ride on the effort of those who do.

Just as the number of children can be considered a tragedy-of-the-commons type situation, the quality of children can be analytically understood in much the same way. When parents invest in the quality of their children they more than likely will have to give up consumption possibilities, either by investing part of their time towards educating their children or by paying for others to do so. Yet with social security what parents will get in return is almost independent of what they invest in their own children – parents who neglect or mistreat their children will receive the same public benefits as everybody else. Again this introduces potential free-riding.

Another way to interpret the issue of child-quality is as something that increases the cost of having children. In that sense, the child-quality issue will magnify the problem society has with ensuring that enough children are born.

23.1.2 Internalizing the child externality?

One tool from the economist's toolbox that can readily address this issue is obvious: the externality can be internalized – by discriminating against agents who choose not to have children (Burggraf, 1993).

This, however, reintroduces a great number of risk factors towards the individual agent that socialized welfare have otherwise done away with; privatizing child-derived benefits will essentially mean the unravelling of the welfare state.

While this approach would, most probably, increase fertility rates (after all; otherwise you would die when you would be too old to support yourself) it hardly seems a suitable method towards ensuring efficient child-quality. To enjoy the whole benefit of sufficient parenting, agents would also have to bear the full risk associated with raising children or society would have to devise sophisticated methods to assess the quality of parenting. Finally, a greater privatization of child-derived benefits would likely reinforce class or race inequalities because the effect from social inheritance would be reinforced. After all

to invest towards child-quality, parents need to have some resources available to invest in the first place. Families with a low amount of resources would therefore not be able to offer the same opportunities to their children (England & Folbre, 1999).

Another solution would be for to society to create institutions within which parents have the incentive to produce children, consider for instance child-subsidies. This would help society increase the children while maintaining the welfare state.

We first turn towards understanding the factors that may impact the number of children that people have.

23.2 Capitalism and fertility

The classical treatise on the economics of fertility is Thomas Robert Malthus's "Essay on the Principle of Population" published in 1778.

Malthus provides a natural starting point for our understanding of how fertility decisions relate to economic decisions. Malthus claimed that there were two driving forces towards the actions of man: consumption of food and sexual desire, or in Malthus' own words:

"[T]he passion between the sexes" (Malthus, 2001, p. 10).

Malthus' two laws can readily be stated as a typical problem of utility maximization under a budget constraint (Becker, 1992).

Within the Malthusian framework the utility to maximize is that arising from consumption of goods and the utility arising from the number of children cf. Equation (30).

$$\begin{aligned} U &= v(x) + b(n) \\ v' &> 0, \quad b' > 0, \quad v'' < 0, \quad b'' < 0 \end{aligned} \tag{30}$$

Where $v(x)$ is the utility arising from consumption of goods and $b(n)$ is utility derived from the number of children.

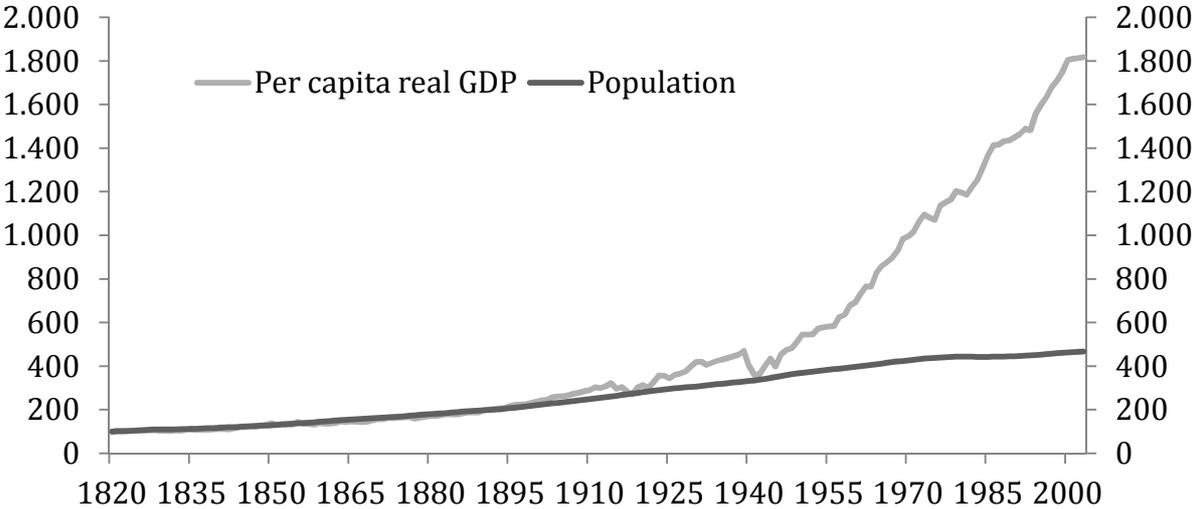
Malthus famously argued that food supply – or more generally income – increase only linearly whereas, if left unchecked, population increases geometrically.

Formulated in economic terms the budget constraint facing the Malthusian man's decision on consumption and reproduction is then:

$$p_x x + p_n n = I, \quad \frac{\partial n}{\partial I} > 0$$

Where I is available income, p_x is the price of consumption and p_n is the cost of children. The budget constraint essentially states that resources spent on consumption and reproduction is bounded by available income. Fertility will therefore closely follow increases or decreases in income (Becker, 1992).

Figure 13. Danish population and GDP, 1820 - 2003



Note: 1820 = Index 100.
Source: Maddison (2007).

Confronted with the economic and demographic developments in Denmark in the two centuries after Malthus, one could easily come to the conclusion that Malthus was wrong – rather than a close relationship between income and population, there seem to be no relation at all, cf. Figure 13.

23.2.1 Have the costs of having children risen?

It can be the case, that changes in the institutions of society have caused an increase in the cost of raising children.

Changes in productive technology have introduced an unprecedented equality in economic opportunities amongst the sexes, and innovations in economic institutions

have shifted old-age dependency from largely being handled by family (Folbre, 1994) towards being socialized into institutional frameworks such as social security (Burggraf, 1993). This has caused a tremendous increase in the opportunity cost of having children (England & Folbre, 1999). England and Folbre suggest that the opportunity cost from forgone market income, lack of remuneration for non-market work and the lost career opportunities amounts to several million US dollars (England & Folbre, 1999).

On top of this comes the associated risk facing homemakers following the break-down of the caste-like family structure that has historically dominated family structures – structures where divorce, desertion and illegitimacy were considered almost unmentionable scandals (Burggraf, 1993).

Family life has changed from the relatively known quantity it once was – today's families can much more easily fall apart. Faced with these risks it becomes even more costly to invest time and effort into raising children rather than securing a market income (Burggraf, 1993). If we bring this back into Malthusian terms: technical and institutional innovations have increased the relative price of children. Parents are therefore less inclined to have children.

This change in the structures of society that has been observed is so far not an indication of any malady within capitalism. The question that one must however pose is what effect will the profit maximizing firm have on child provision? A firm that can increase its profits by offering higher wages will do so, and the consequence will be that the opportunity cost of having children will increase yet again.

Thus we have seen that the changing structures of society generally emphasize the cost of raising children and increase the possible gain from free-riding on children provided by others. In the next section we will turn towards work-life balances and its impact on child quality.

23.3 Market effects on work-life balances and child quality

The purpose of this section is to explore the co-dependency of child quality and parent's work. The aim is to understand the situation, that for many people the issue is not whether they have a job but rather that they have a job which demands too much work from them (N. Smith, Pedersen, Pedersen, & Schultz-Nielsen, 2003).

It is a relatively well-known issue that many families struggle with finding a satisfying balance between time devoted towards work and time spent with the family (Hallberg & Klevmarken, 2003). The issue has come to a point where nearly half of all surveyed Danes report that they work more than they would like to, and that nearly one third of spouses complain that their partner is over-worked (Birkemose & Madsen, 2006). Primarily it is the highly educated part of the populace that has seen an increase in overall work time; from 1987 thru 2001 the daily number of hours worked – both at work and at home – increased by approximately one hour (N. Smith et al., 2003).

This apparently rapid increase in the hours worked definitely warrants further investigation and we therefore pose the question: is there something inherent in the market equilibrium that forces families into the dissatisfying struggle with making ends meet time-wise?

The aim of this section is to illustrate how divergent interests can result in socially suboptimal levels of work, leisure and child quality. The idea is that by spending more time on leisure parents will spend more time raising their children which in turn will improve the quality of the children.

In the following we will construct a simple model which will allow us to analyze the effects of market equilibrium in time allocation between work and leisure and the imputed effects that this allocation will have on the quality of future workers. Finally the market outcome will be compared with the outcome when institutions are put in place that can allow for the optimal allocation of time towards improving child quality.

23.3.1 The model

Consider an economy with only one sector, only one good and only one firm. In the economy there are two agents; one who owns the firm and one who supplies labour. The firm owner compensates the labour supplying agent for work by sharing part of the production according to a wage schedule and consumes whatever is left from production. There is therefore no market in the model and the problems arising are how much work the worker will provide and what wage schedule the firm owner will offer.

Fertility decisions are for simplicity abstracted away, the economy will perpetually have one firm owner and one worker where the amount of work provided by the worker has spill-over effects on the quality of future generations.

Likewise we abstract away gender consideration. An alternative interpretation of the model is that the labour supplying agent represents a family unit. Empirical evidence suggests that family supply of market labour can be considered as a unit; if one spouse supplies more labour the other spouse will tend to spend more time with children (Hallberg & Klevmarken, 2003).

Note that unless explicitly stated otherwise all variables are considered in period t .

23.3.2 *Firm profit*

The firm operates within a closed economy and has a profit function as given in equation (31).

$$\Pi = Q(l_w; \gamma) - \eta(w(l_w); l_w) \quad (31)$$

Firm profit thus depends on quantity produced, $Q(l_w; \gamma)$, for a given amount of work, l_w , quality of workers, γ , and subtracted wage costs $\eta(w(l_w); l_w)$ which in itself depends on the wage schedule $w(l_w)$.

Wages increase monotonically with the number of hours worked and thus reflects that people who devote more time to their career usually will extract larger rents from doing so. The wage schedule will be further defined below.

Worker quality is assumed exogenous to the firms profit maximization problem which has the implication that the firm do not take the effects on the quality of future workers into account when optimizing profits, the firm is essentially myopic. The justification for this simplifying assumption is that in everyday life any given firm cannot be sure that resources devoted to increase future worker quality will be to their advantage, there is no guarantee that coming generations will work for the firm let alone that the firm may not even exist in the future.

23.3.3 *Agent preferences*

Assume that the working agent derive utility from both her career and from time spent on leisure. The agent therefore maximizes the utility function given in equation (32).

$$U = (\eta(w(l_w); l_w))^\alpha (l_l)^\delta \quad (32)$$

$$\alpha, \delta \in (0; 1), \alpha + \delta = 1$$

Where l_w is the amount of time worked and l_l is time spent on leisure. Note that neither fertility decisions, parental utility arising from goods-consumption, utility derived from having children nor the quality of children is explicitly modelled. This sets this contribution apart from the literature, usually parents are assumed to derive utility from human-capital build-up in their children (Becker, 1992) or parents are assumed to derive an altruistic utility from having children (Barro & Becker, 1989; Becker & Barro, 1988).

Utility derived from these factors are however implicitly included in the model, increased payoff from work can also represent increased consumption possibilities and increased utility from leisure can also include utility from spending time with children.

23.3.4 *The budget constraint facing agents*

Agents make decisions on how to allot available time, L , between work and leisure. The budget constraint facing agents is given by:

$$L = l_w + l_l$$

To simplify computations available time is normalized to unity; this yields the simplified budget constraint given in equation (33). This further allows for a rearranging of terms whereby time spent on leisure by definition will be equal to the difference between available time and time spent on work.

$$1 = l_w + l_l \Leftrightarrow l_l = 1 - l_w \quad (33)$$

Inserting the simplified budget constraint from equation (33) into the equation for utility gives the simplified utility function given in equation (34).

$$U = (\eta(w(l_w); l_w))^\alpha (1 - l_w)^\delta \quad (34)$$

In this sense time spent on work can be interpreted as the part of the agent's day, week, year or even life devoted towards work.

23.3.5 *Modelling time devoted towards career building*

The wage schedule is assumed to increase monotonically with the amount of time devoted towards work. This is tantamount to assuming that firms create incentive

packages for workers to work more, or that as one devote time towards a career the compensation for working increases. We specify the wage schedule as in equation (35).

$$w(l_w) = l_w^\beta \quad (35)$$

We will refer to β as the return to career, where a larger β will give the agent an incentive to work more because an extra effort will have a higher additional payoff. When $\beta \in (0; 1)$ it follows that

$$\frac{\partial w(l_w)}{\partial l_w} = \beta l_w^{\beta-1} > 0$$

and that

$$\frac{\partial^2 w(l_w)}{\partial l_w^2} = (\beta - 1)\beta l_w^{\beta-2} < 0$$

In other words, the wage schedule is increasing with how much the agent works and the growth rate in the wage schedule is decreasing with the amount of work.

The wage schedule is only part of determining the agent's earnings. To find the agent's earnings multiply the wage schedule in equation (35) with amount worked; cf. Equation (36).

$$\eta(w(l_w); l_w) = w(l_w)l_w = l_w^{1+\beta} \quad (36)$$

For the agent's earnings it then follows that

$$\frac{\partial \eta(w(l_w); l_w)}{\partial l_w} = (1 + \beta)l_w^\beta > 0$$

and

$$\frac{\partial^2 (\eta(w(l_w); l_w))}{\partial l_w^2} = (1 + \beta)\beta l_w^{\beta-1} > 0$$

The interpretation is that working more will lead to higher earnings and earnings are furthermore ever increasing in the amount of time devoted towards work. It again follows that a higher return to career will provide the agent with an incentive to provide

more work. The higher the return to career the greater the earnings increase from working more.

The agent's earnings can also be interpreted to represent the degree of inequality in the economy. In that sense, a greater return to career then corresponds to a more unequal society. Greater income disparities have been found to be one of the reasons behind differences in hours worked (Bell & Freeman, 2001).

23.3.6 *Utility maximization*

The solution to the utility maximization problem is found by first inserting the expression for earnings, equation (36), into the simplified utility function to yield equation (37).

$$U = l_w^{(1+\beta)\alpha} (1 - l_w)^\delta \quad (37)$$

Differentiating equation (37), setting equal to zero and solving for l_w yields the optimal share of time spent on work, cf. Equation (38).

$$l_w^* = \frac{(1 + \beta)\alpha}{(1 + \beta)\alpha + \delta}, \quad l_w \in (0; 1) \forall \alpha, \beta, \delta \in (0; 1) \quad (38)$$

Equation (38) means that the agent will at all times supply a fraction of available time as labour. The agent's supply of work is increasing in both return to career and agent's preference for work since $\frac{\partial l_w^*}{\partial \alpha} > 0$ and $\frac{\partial l_w^*}{\partial \beta} > 0$. Finally a higher preference for leisure δ leads to a lower supply of labour since $\frac{\partial l_w^*}{\partial \delta} < 0$.

The firm has the ability to change β and this therefore have the implication that the firm is able to tweak the agent's labour supply by adjusting the return to career.

23.3.7 *Quality determination of children*

Quality of the future generation is assumed to depend on the amount of time parents devote to leisure time. We assume that at least part of this time will be spent by parents with their children and thereby increase both the human and social capital of their children, cf. equation (39).

$$\gamma_{t+1} \equiv \Gamma(l_{l,t}) = \Gamma(1 - l_{w,t}) \quad (39)$$

This formulation, especially if child quality is interpreted as build-up of human capital that depends negatively on parental work-time, is consistent with empirical research. Norberg-Schönfeldt (2008) finds that a reduced number of hours worked by mothers leads to better educational attainments of children.

The formulation used simply assumes that child quality depends on the time that parents spend on leisure. Since this model is intended for studying the effects on child quality arising from parents working full time, this seems a benign assumption, but in general the empirical findings suggest that some work is better than no work at all (Norberg-Schönfeldt, 2008). Other studies, however, find that the socioeconomic status of the parents is by far the most important factor in the educational attainment of children (Levitt & Dubner, 2005).

Since the intent of the model is to analyze the consequences of the capitalistic market equilibrium on families that are highly educated, are time constrained and find it difficult to find an appropriate balance between work and family life, we deem it justified to assume that too much work can hamper child quality. One should however be cautious with extrapolating the results towards the general population.

Assume that child quality is determined by a threshold function, i.e. for leisure time beneath a certain level, the derived child quality will be low whereas for leisure time above this threshold, child quality will be high. Child quality is determined as in equation (40).

$$\gamma_{t+1} \equiv \Gamma(l_t) = \Gamma(1 - l_{w,t}) = \begin{cases} \gamma_{low} \quad \forall l_{w,t} > \bar{l}_w & \text{low quality} \\ \gamma_{high} \quad \forall l_{w,t} \leq \bar{l}_w & \text{high quality} \end{cases} \quad (40)$$

Assuming that child quality is defined by a threshold function can be considered equivalent to the tiers of the educational system. To progress from one level (primary school to high school, high school to college, etc.) the child must have acquired a sufficient level of social and human capital. For simplicity we only consider two tiers.

23.3.8 Firm profit maximization

Assume that the productive technology is linear in work and increases with the quality of the worker. Total output from a given amount of work and a given level of quality is then:

$$Q(l_w, \gamma) \equiv \gamma l_w$$

The profit maximization facing the firm is then obtained by inserting the equation for the firm's productive technology into the firm's profit function, equation (31), which reduces the profit maximization problem to equation (41).

$$\Pi = \gamma l_w - l_w^{1+\beta} \quad (41)$$

From equation (41) it follows that $\frac{\partial \Pi}{\partial \gamma} > 0$. Worker quality thus has a great impact on firm profit. The firm, however, treats worker quality as exogenous and simply uses it to determine the profit maximizing level of labour; the quality of workers depend entirely on child quality one period earlier and the firm will therefore not choose to devote resources towards increasing future worker quality.

The amount of work that will maximize firm profit thus follow from differentiating equation (41) with respect to l_w . The amount of work that maximizes firm profit is given by equation (42).

$$l_w^{**} = \left(\frac{\gamma}{1+\beta} \right)^{\frac{1}{\beta}}, \quad \forall \gamma \in \{\gamma_{low}; \gamma_{high}\} \quad (42)$$

From equation (42) it follows that the firms demand for labour increases with worker quality.

23.3.9 Labour market equilibrium

Assume, that the firm is incapable of dictating the amount of work, l_w^* , that agents provide but can only provide agents with an incentive to work more by changing the return to career, β .

For a given level of worker quality the firm will try to adjust β such that $l_w^* \geq l_w^{**}$. The inequality illustrate, that while the firm may set β such that it encourages an increase in

labor offered, the firm will never employ more labour than l_w^{**} as this would only serve to yield a profit below maximum.

Solving $l_w^{**} = l_w^*$ is tedious and unnecessary for inference. Instead we turn to how the firm's profit responds to changes in the return to career. The first derivative of the profit maximization problem with respect to β is always greater than zero, cf. equation (43).

$$\frac{\partial \Pi}{\partial \beta} = -l_w^{1+\beta} \ln(l_w) > 0, \quad \forall l_w \in (0; 1) \quad (43)$$

Firm profit is therefore universally increasing in β . The firm will therefore choose the largest possible return to career.

While this do change the amount of labour supplied by the working agent, the firm can safely dictate such a wage schedule without worrying whether supplied work will fall; the worker's supply of labour follows from equation (38) which is also uniformly increasing in β since $\frac{\partial l_w^*}{\partial \beta} > 0$.

Time spent on work is then given by equation (44).

$$\tilde{l}_w = \min(l_w^{**}; l_w^*) = \min\left(\left(\frac{\gamma}{1+\beta}\right)^{\frac{1}{\beta}}; \frac{(1+\beta)\alpha}{(1+\beta)\alpha + \delta}\right) < 1 \quad \forall \alpha, \beta, \delta \in (0; 1) \quad (44)$$

The amount of work employed/provided is therefore the smallest of either the amount of work that maximizes firm profit or the amount of work that maximizes agent utility. The next step is to determine the effect on child quality arising from the equilibrium level of work.

23.3.10 Labour market equilibrium and the effect on child quality

Combine the equation for the labour market equilibrium equation (44) and the equation determining child-quality, equation (40), to get the effect of labour market equilibrium on child-quality build up, given in equation (45).

$$\gamma_{t+1} = \Gamma(1 - \tilde{l}_w) = \min\left(\Gamma\left(1 - \left(\frac{\gamma}{1+\beta}\right)^{\frac{1}{\beta}}\right); \Gamma\left(1 - \frac{(1+\beta)\alpha}{(1+\beta)\alpha + \delta}\right)\right) \quad (45)$$

Child quality thus depends on the market equilibrium level of work. For further inference we need to consider specific properties of agent's preferences, the firm's demand for work and how worker quality affects the productive technology.

There are a host of possible combinations of both firm demand and labour supply that can have consequences for the quality of children.

Only one aspect will be considered in detail: the struggle between making ends meet time-wise and its possible spill over effect on child quality.

It was found, that by modelling a return to career the firm was capable of altering the agent's preference for work – this will mean that as the firm maximizes profits it will increase the return to career to push the agent to harder. If agent's preferences are such that work supplied will at all times be below \bar{l}_w this will not have consequences for child quality; it will at all times be high. The other extreme is when agent's preferences are such that work supplied will at all times exceed \bar{l}_w then the profit maximizing firm will squeeze more work out of the agent but again the capitalistic market equilibrium will have no consequences for child quality – it will alone be the agent's preferences that affect child quality which will at all times be low.

The interesting case is if the agent's preference for work are such that, absent of a return to career they supply less than \bar{l}_w . In other words, without the return to career the agent would supply work at a lower level which would yield high quality children by improving the human and social capital build-up. However, the profit maximizing firm increases the return to career and this has the effect that the agent's supply increases to a level above \bar{l}_w . In other words, the myopic profit maximizing nature of the firm will in this case lead to lower child quality.

The important aspect of this is that the firm can increase profits by increasing the amount of time that agents work and that the firm has no incentive to take the effect on child quality into account. This is the direct opposite of the planner.

The planner will in her decision not be limited to only consider the current period but will instead consider the effect of actions today on the generations tomorrow. The planner will have an incentive towards creating a sensible balance between work and

family life, if nothing else then because it may have a positive spill-over effect on future generations.

23.4 Conclusion on the effects of capitalism on children

There are two important points arising from this section.

First, children are a necessity for the continued existence of society. Judging from the below replacement fertility rate in about any western economy there indeed seems to be something systemic about these economies that have led to this decline in fertility. One possible explanation is that children have changed from being a private good to being a public good, that the opportunity costs have increased dramatically and that the capitalistic market's incentive structures are tipping the balance towards more work and less children.

Second, we saw that the profit maximizing firm's demand for labour may have adverse effects on the quality of children through an in-optimal production of social and human capital. The important point is that the firm will always ignore whether it demands labour at a level that impairs child quality – this is in stark contrast to the planner who has every incentive towards taking the quality of future generations into consideration.

The two points above are closely related. The issue is that if firms are myopic they will not consider the future consequences of their actions – in this sense the problem is closely related to all other externalities created by firms. But are firms really myopic? Well they have every incentive to be so. The actions of a firm would not be profit maximizing if it were to take, for instance, child quantity or quality into consideration. The firm would never know that the investment it performs would be of any benefit to the firm.

Thus in the case of capitalism and work-life balances the consequences of the capitalistic profit-maximizing firm are double; the actions of the firm will damage both TFP – through lower levels of social and human capital – and through the amount of labour that can be imputed as a factor.

In the model we have presented the case that the gains from working less, results in a level of social and human capital that offsets the profits foregone by the firm. Whether there in fact exists a net efficiency gain from having parents spend more time with their

children is uncertain. Even if an empirical analysis could show, that encouraging parents to use more time towards child-rearing, would not create more wealth, there can still be gains from implementing this policy in a planned economy. In a planned economy it is possible to remove the trade-off between career and family-time. Although it may be costly for society to remove this trade-off, it might be worth it. In a capitalistic economy the choice does not even exist.

24 COORDINATION FAILURE

In a capitalistic economy characterized by atomistic competition, problems of coordination can arise. If there are several Nash equilibria in an economy and if these equilibria can be Pareto-ranked, then there is a risk that the economy can get stuck in a suboptimal equilibrium where no single firm has the incentive to change strategy – but if all firms changed strategy the economy could increase efficiency. This is the problem of coordination failure. The issue of coordination failures is an example of pure TFP, there really is no factor to account for. Either the firms in an economy are capable of coordinating on equilibriums with higher efficiency or not.

This section will investigate how well the institution of capitalism supports that firms coordinate on the high-efficiency equilibrium or whether there is a risk that the economy ends up being trapped in suboptimal equilibriums.

24.1 Coordination failure – theory

Cooper and John (1988) show how problems of coordination failure can be analyzed in a game-theoretic framework. They set up a game where the agents in the economy are non-competing industries or firms; this would, for example, be the case if they produce different goods. Each firm chooses an action $e_i \in [0, E]$ where E is a finite number - this can be thought of as choosing how much to produce. We assume that there are positive externalities:

$$\frac{\partial \pi(e_i, e_{-i})}{\partial e_{-i}} > 0 \quad (46)$$

Where $\pi(\cdot)$ denotes the profit function and e_{-i} is the action chosen by all other firms than firm i . Equation (46) then states, that the first derivative of firm i 's profit function is

positive with regard to the production of all other firms. This means that the profit of a firm rises when all other firms increase their production – one can think of aggregate demand rising and thereby creating more demand for firm *i*.

For there to be multiple symmetric Nash equilibria it is a necessary condition that the game exhibits strategic complementarity. If we denote the reaction function of firm *i* as $R_i(\cdot)$ this can be written as:

$$R'_i(e_{-i}) > 0 \tag{47}$$

The reaction function gives the optimal strategy as a function of the strategy of all other firms. Equation (47) states that the first derivative of the reaction function is positive, this means that when all other firms raise their production it is optimal for firm *i* to raise its production as well. The game exhibits strategic complementarity because it is optimal to follow the strategy of other agents. If the optimal strategy was to do the opposite – that is to reduce production – then the game would exhibit strategic substitutability. Cooper and John (1988) show that strategic complementarity is a necessary condition for the existence of multiple symmetric Nash equilibria. The argument can be understood by the illustrations in Figure 14 and Figure 15.

Figure 14. Strategic substitutability and one equilibrium

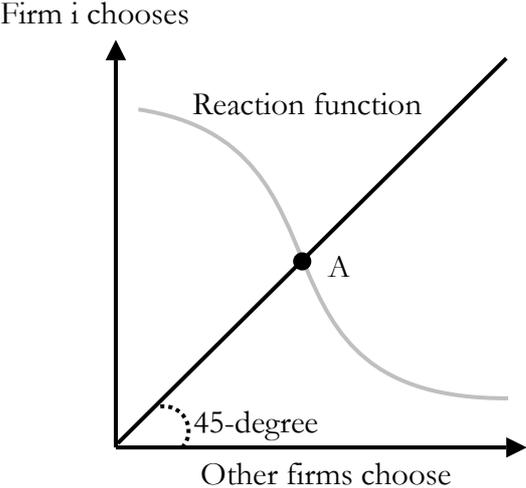
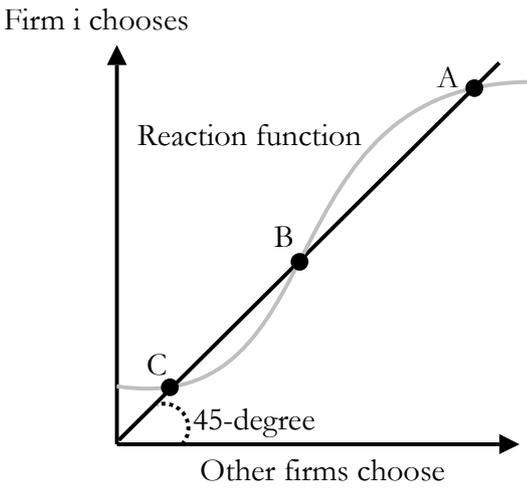


Figure 15. Strategic complementarity and multiple equilibria



The 45-degree line depicts all possible symmetric outcomes and when the reaction function intersects the 45-degree line we have a symmetric Nash equilibrium, meaning that no firm has an incentive to change strategy. With a downwards sloping reaction function – as seen in Figure 14 - it is only possible to have one symmetric Nash-

equilibrium. This is the equilibrium marked A in Figure 14. While the upward sloping reaction function in Figure 15 produces three symmetric Nash-equilibria – marked A, B and C. This shows why an upward sloping reaction function – which is the same as strategic complementarity – is a necessary condition for multiple symmetric Nash-equilibria. In Figure 15 the equilibrium B is unstable while A and C are stable equilibria. This can be seen by moving a little to the right (or left) of each equilibrium and notice that the dynamics of the reaction function draws the economy back to A and C but away from equilibrium B.

24.2 Pareto-ranking of equilibria

If the different equilibria represent the same efficiency then there is no problem. But if we assume that the equilibria can be ranked according to economic efficiency – i.e. Pareto-ranked – then it matters which equilibrium the economy ends up in. Let us continue with the example of choosing production quantity. Let equilibrium C correspond to a low level of production – or a recession – and let equilibrium A correspond to a high level of production. If the reaction function $R(\cdot)$ is continuous then positive externalities as assumed in equation (46) is a sufficient condition for Pareto-ranking of multiple equilibria (Cooper & John, 1988).

With atomistic competition in an economy with multiple Pareto-ranked equilibria there is a risk that an economy can get stuck in an inefficient stable equilibrium. If the economy gets stuck in equilibrium C in Figure 15 no individual firm has the incentive to raise production alone. It is only profitable for a single firm to raise production if all firms do the same. This only shows the theoretical possibility of coordination failure. More specific assumptions are needed to explain why the economy will get stuck in an inefficient equilibrium instead of an efficient one.

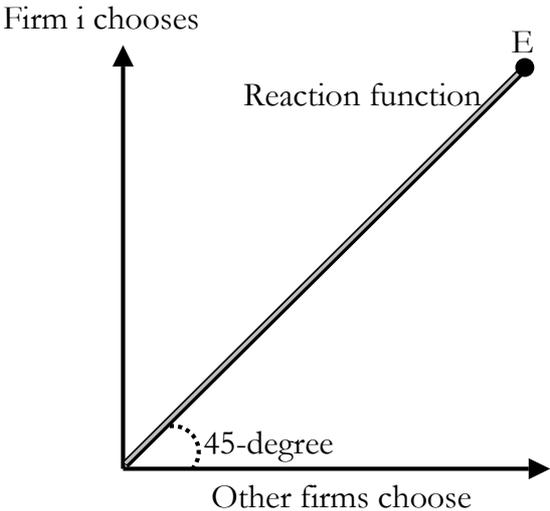
24.3 Risk and coordination

Bryant (1983) proposes a model with a continuum of inefficient Nash-equilibria, as in the model above the strategic variable is production quantity. Let us assume the following reaction function:

$$R_i(e_1, e_2 \dots e_N) = \min[e_1, e_2 \dots e_N], \quad i \in [1, N], \quad e_i \in [0, E] \quad (48)$$

Equation (48) says that the optimal production for a firm equals the lowest production chosen by any of the N firms. The result is that the reaction function coincides with the 45-degree line so that any point on the 45-degree line up until the limit E is a symmetric Nash-equilibrium, cf. Figure 16.

Figure 16. Continuum of equilibria



If efficiency rises with production then the equilibria can be Pareto-ranked where the equilibrium E is the Pareto-optimum.

Just as before is there no reason to assume that the economy will end up in an inefficient equilibrium, there is only a very large amount of inefficient equilibria. But if we add an assumption that the efficient equilibrium is also the most risky one then we can argue that the economy will most likely end up in an inefficient equilibrium.

Huyck et al. (1990) proposes a model with a continuum of symmetric Nash equilibria and where riskiness increases with economic efficiency. They assume a game with N firms and two stages. In the first stage firms choose how much to produce and pay the cost of this production. In the second stage demand is determined by the smallest production quantity chosen by any firm.

The payoff function of this game is shown in equation (49) where p is the price and c is the cost:

$$\begin{aligned}
\Pi_i(e_i, e_{-i}) &= \min(e_1, \dots, e_N) \cdot p - c \cdot e_i \\
i &\in [1, \dots, N] \\
p &> c > 0 \\
e_i &\in [0, E]
\end{aligned}
\tag{49}$$

If a firm produces more than the minimum production of other firms then it pays the full cost of e_i but less is demanded because $e_i > \min(e_i, e_{-i})$. This means that the firm could have had a larger profit if it had chosen a lower production. If the firm had chosen to produce $\min(e_i, e_{-i})$ it could have raised its profit with the amount $(p - c)[e_i - \min(e_i, e_{-i})]$. Also one can see from this game that since $p > c$ it is Pareto-optimal if all firms choose the highest production; E. The important point in this game is that the Pareto-optimal equilibrium can only be attained if all firms choose the most risky strategy.

Huyck et al. (1990) have created an experimental design with similar attributes as the game above. They presented seven individuals with the pay-off matrix in Table 4.

Table 4. Pay-off matrix for a game with risk and Pareto ranked multiple equilibria

		Smallest Value of X Chosen						
		7	6	5	4	3	2	1
Your Choice of X	7	1.30	1.10	0.90	0.70	0.50	0.30	0.10
	6	-	1.20	1.00	0.80	0.60	0.40	0.20
	5	-	-	1.10	0.90	0.70	0.50	0.30
	4	-	-	-	1.00	0.80	0.60	0.40
	3	-	-	-	-	0.90	0.70	0.50
	2	-	-	-	-	-	0.80	0.60
	1	-	-	-	-	-	-	0.70

Note: All values are in US dollars.

Source: Huyck et al. (1990).

There are seven symmetric Nash-equilibria in Table 4 namely if all participants choose the same number. The equilibria are Pareto-ranked with raising total and individual pay-off as higher values are chosen. The Pareto-efficient equilibrium is attained if all individuals choose the number 7. The seven equilibria can also be ranked by risk. If an individual chooses the action '1' she is certain to get \$0.70 in payoff because she can be certain that her choice of '1' is the smallest value chosen. On the other hand if an individual chooses the value '7' then she will be paid \$1.30 if all others choose the same.

However, by choosing the value '7' you risk that a risk-averse player has chosen the value '1' and this is enough to make you end up with only \$0.10 in pay-off. This makes the Pareto-optimal equilibrium much harder to attain because it is the most risky.

In the experiment that was conducted by Huyck et al. (1990) there were one hundred and seven students participating, all organized in groups of fourteen to sixteen. The game was repeated ten times to give the participants a chance for learning. In the first round the Pareto-efficient action '7' was chosen by thirty-one percent while only two percent chose the safe action '1'. By the last round seventy-two percent adopted the safe strategy. When interviewed some participants explained that it was too risky to play any other action than the safe choice.

24.3.1 *A more realistic game with less risk*

The use of the reaction function in equation (49) presupposes a very high degree of dependence between agents. For it to be realistic that the minimum production determines the absolute demand of all other firms, one can think of firms as producing intermediate goods to the same manufacturer. A more general and realistic approach could be to say that a firm's demand is determined by the average production of other firms - instead of the minimum production. This would give a profit function for a single firm as follows:

$$\begin{aligned} \Pi_i(e_i, e_{-i}) &= \begin{cases} \text{avg}(e_1, \dots, e_N) \cdot p - c \cdot e_i & , \text{for } e_i \geq \text{avg}(e_1, \dots, e_N) \\ e_i \cdot p - c \cdot e_i & , \text{for } e_i < \text{avg}(e_1, \dots, e_N) \end{cases} \\ & \quad i \in [1, \dots, N] \\ & \quad p > c > 0 \\ & \quad e_i \in [0, E] \end{aligned} \tag{50}$$

Equation (50) says that a firm producing less than the average will be able to sell all of its produce but had it produced more it would have earned a higher profit. If a firm produces more than the average of all firms then it will have to incur the cost of all of its production but it can only sell an amount equal to the average production. Thereby the continuum of symmetric Nash-equilibria is preserved and the risk- and Pareto-ranking of these equilibria rise with the choice variable e_i . However the chance of agents cooperating on a high equilibrium is much higher than was the case with the profit function in equation (49). The amount one can lose is the same but the risk is now less

because one risk-averse player choosing a low production can be outweighed by another player's decision.

If this change was included into the experiment conducted by Huyck et al. (1990) the dynamic would change so the best strategy in period two would be to choose the average instead of the minimum value. The average of all choices in the experiment conducted was 5.2 and it would be a good guess to say that the players would cooperate around this equilibrium.

24.4 Coordination failure and strategic uncertainty

Strategic uncertainty is another phenomenon that makes it harder for agents to reach a social optimum when there are multiple equilibria. Strategic uncertainty means that agents are unsure about the strategy of other agents. The example above with risk is an example of strategic uncertainty – if all players had an assumption of common risk neutrality then they would all make the most profitable choice. Even in a game where the social optimum equilibrium is not the most risky there can still be problems of strategic uncertainty. If agents do not have an assumption of common rationality then it is not obvious which strategy is optimal for the individual player. This problem is analyzed by Fehr and Tyran (2007) with an experiment where the choice variable $P \in [1, 2, \dots, 30]$ is called 'price' and the payoffs are inflated with the choice variable. This means that the players need to deflate the nominal payoffs with the price in order to calculate the real payoff which they will be paid. The idea is that individuals who suffer from money illusion will think that a high nominal payoff also corresponds to a high real payoff. The attributes of the game is reported in Table 5.

Table 5. Equilibria and payoffs in both real and nominal terms

Equilibrium	Equilibrium price level	Real equilibrium payoff	Nominal equilibrium payoff
A	$P_A = 4$	$\pi_A = 28$	$P_A \pi_A = 112$
B	$P_B = 10$	$\pi_B = 5$	$P_B \pi_B = 50$
C	$P_C = 27$	$\pi_C = 21$	$P_C \pi_C = 567$

Source: Fehr and Tyran (2007).

There are three equilibria in the game and the payoff dominant equilibrium A is attained when all players choose the price $P_A = 4$ while the highest nominal payoff is reached in equilibrium C. The payoff matrix in Table 6 was presented to the players.

Table 6. Payoff matrix in nominal terms

Selling price	Average price of other firms																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1	13	11	11	15	19	15	13	12	11	10	11	12	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
2	24	25	19	25	32	22	16	14	12	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
3	13	48	44	58	73	37	23	16	13	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
4	6	25	84	112	140	84	39	22	15	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
5	3	11	44	58	73	162	88	37	19	12	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
6	2	7	19	25	32	84	168	80	29	12	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
7	2	5	11	15	19	37	88	152	59	14	13	14	15	16	17	18	19	19	20	21	22	23	24	25	26	27	28	29	30	31	
8	2	4	8	10	13	22	39	80	108	18	14	15	15	16	17	18	19	20	21	22	23	24	25	25	26	27	28	30	31	32	
9	1	3	6	8	10	15	23	37	59	30	17	16	17	17	18	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
10	1	3	5	7	9	12	16	22	29	50	22	19	18	18	19	19	20	21	21	22	23	24	25	26	27	28	29	30	31	32	
11	1	3	5	6	8	10	13	16	19	30	39	26	22	21	20	20	21	21	22	23	24	24	25	26	27	28	29	30	31	32	
12	1	3	4	6	7	9	11	14	15	18	66	48	31	25	23	22	22	22	23	23	24	25	26	27	27	28	29	30	31	32	
13	1	2	4	5	7	8	10	12	13	14	39	84	59	36	29	25	24	24	24	24	24	25	25	26	27	28	29	30	31	32	33
14	1	2	4	5	6	8	9	11	12	12	22	48	104	70	42	32	28	26	26	26	26	26	27	28	28	28	29	30	31	32	33
15	1	2	4	5	6	8	9	10	11	12	17	26	59	126	83	48	36	31	29	28	27	27	28	28	29	30	31	32	33	34	
16	1	2	4	5	6	7	9	10	11	11	14	19	31	70	150	96	54	40	34	31	30	29	29	29	30	30	31	33	33	34	
17	1	2	3	5	6	7	8	9	10	11	13	16	22	36	83	176	111	61	44	36	33	32	31	31	31	31	31	32	34	35	
18	1	2	3	5	6	7	8	9	10	11	12	15	18	25	42	96	204	126	68	48	40	36	34	33	32	32	34	35	35	36	
19	1	2	3	4	6	7	8	9	10	10	12	14	17	21	29	48	111	234	143	76	53	43	38	36	35	34	35	37	37	37	
20	1	2	3	4	6	7	8	9	10	10	12	13	15	18	23	32	54	126	266	160	84	57	46	41	38	36	38	39	39	38	
21	1	2	3	4	5	7	8	9	10	10	12	13	15	17	20	25	36	61	143	300	179	92	62	49	43	40	42	43	42	41	
22	1	2	3	4	5	7	8	9	10	10	12	13	14	16	19	22	28	40	68	160	336	198	101	67	53	46	48	50	46	44	
23	1	2	3	4	5	6	8	9	9	10	11	13	14	16	18	20	24	31	44	76	179	374	219	110	73	57	59	61	54	49	
24	1	2	3	4	5	6	7	8	9	10	11	13	14	15	17	19	22	26	34	48	84	198	414	240	120	78	81	84	67	57	
25	1	2	3	4	5	6	7	8	9	10	11	12	14	15	17	18	21	24	29	36	53	92	219	456	263	130	135	140	93	71	
26	1	2	3	4	5	6	7	8	9	10	11	12	14	15	16	18	20	22	26	31	40	57	101	240	500	286	297	308	157	99	
27	1	2	3	4	5	6	7	8	9	10	11	12	14	15	16	18	19	21	24	28	33	43	62	110	263	546	567	588	348	168	
28	1	2	3	4	5	6	7	8	9	10	11	12	13	15	16	17	19	21	23	26	30	36	46	67	120	286	297	308	667	375	
29	1	2	3	4	5	6	7	8	9	10	11	12	13	15	16	17	19	20	22	24	27	32	38	49	73	130	135	140	348	720	
30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	16	17	18	20	21	23	26	29	34	41	53	78	81	84	157	375	

Source: Fehr and Tyran (2007).

The payoff for an individual player is determined by her own price and the average price chosen by other players. To calculate the real payoff one has to divide the nominal payoff with the average price of other firms. The structure of the payoff matrix in Table 6 is designed to make equilibrium B – where all players choose $P_B = 10$ – unstable while equilibrium A and C are stable. To see this imagine that all players choose the price ‘11’ then the optimal answer is ‘12’, cf. Table 6, and in this way the imposed incentive structure drags players away from equilibrium B. If the average price is closer to the two other equilibria then the incentive structure drags the players towards these.

According to Fehr and Tyran (2007) money illusion can have a direct and an indirect effect. The direct effect is that agents suffering from the irrationality will choose too high prices because there are high nominal payoffs when high prices are chosen – see the lower right corner of Table 6. The indirect effect is caused by the perception of other’s irrationality. If a player that does not suffer from money illusion believes that other players might be prone to such irrationality then her rational response is to choose high numbers as well. It is only with the assumption of common rationality that a player’s optimal strategy is the payoff dominant price $P_A = 4$.

The experiment was conducted with students organized in groups of five or six and the game was repeated 30 times. Each player was given specific instructions on how the game worked and how to calculate real payoff. The average price chosen by players in the first period was 20.1 and not one individual chose $P_A = 4$ – which is a sign that money illusion had an impact. Over the next thirty rounds most groups cooperated on the stable but inferior equilibrium C.

To isolate the effects of money illusion and the effect of strategic uncertainty Fehr and Tyran (2007) also had groups who were given a payoff table in real terms and also groups who played against computer opponents – where the players were told that the computer would choose the best response to the price that they chose. When playing against computer opponents you do not have strategic uncertainty.

In the groups with human opponents and payoff tables in real terms the average price of the first period was eight and sixty-two percent choose $P_A = 4$ over the next thirty periods all groups managed to cooperate on the efficient equilibrium. Amongst the players who were given payoff tables in nominal terms but who played against a computer opponent twenty-three percent chose the efficient equilibrium in the first round. By the last round more than eighty percent was on the efficient equilibrium. This shows that individual players can learn to see through the ‘veil of money’ but when put in a strategic situation the indirect effect of strategic uncertainty makes it much harder for players to cooperate on the payoff dominant equilibrium. People can be irrational in many ways but the interesting point here is that the perception of irrationality is enough to have economic consequences because of strategic uncertainty.

24.5 Coordination failure and the passage of time

In the examples above we have assumed that the choices between equilibria exist at the same time. Assume instead that a new Pareto-dominant equilibrium can emerge after some time making the current equilibrium suboptimal. This will impose a problem if agents do not have the incentive to change their strategy unilaterally towards the newly emerged equilibrium. This is an effect of the passage of time where new knowledge or new technology makes it apparent that a current strategy is no longer optimal.

24.5.1 *New technology and network effects*

If a consumption good is characterized by network effects this means that consumers' utility rise when more agents consume the certain good (Tirole, 1988, p. 405). The telephone is an example of a good with direct network effects. It is only useful if there are others to call and the utility of a telephone rises when more people own a telephone. There is an indirect network effect if more compatible products are supplied to a certain good – this could be programs written for a specific brand of computers or movies or music being sold in a specific format compatible with certain players.

Farrell and Saloner (1985) introduce a model with two consumers who can choose to stick with an old technology or adopt a new one. The utility of each consumer depends on which good they consume and on the number of agents consuming the same good. If we let n be the number of consumers then we can let $U_{old}(n)$ denote the utility when a consumer is sticking with the old technology and $U_{new}(n)$ is the utility for a consumer who adopts the new technology – both functions are net of switching costs (Farrell & Saloner, 1985). Equation (51) states the assumption corresponding to a positive network effect:

$$U_{old}(2) > U_{old}(1) \quad \text{and} \quad U_{new}(2) > U_{new}(1). \quad (51)$$

The equation says that utility rises when more consumers choose the same technology.

In equation (52) and (53) we add the assumption that it is always best to choose the same technology as the other – but if both adopted the new technology this would be optimal (Farrell & Saloner, 1985).

$$U_{new}(2) > U_{old}(1) \quad \text{and} \quad U_{old}(2) > U_{new}(1) \quad (52)$$

$$U_{new}(2) > U_{old}(2) \quad (53)$$

24.5.2 *Excess inertia*

If the two consumers both stick with the old technology because they fear that the other will not switch, then we have a problem of excess inertia. Excess inertia means that the adoption of a new and better technology is delayed – in this case because of coordination failure (Farrell & Saloner, 1985).

In this simple framework excess inertia is only a problem if players choose strategies simultaneously. If we assume that this is a game played in real time then as soon as one consumer switches the best response for the other will be to follow. If both consumers know that the other will follow then the inferior solution is not a subgame perfect Nash-equilibrium – there is no threat that the other consumer will not switch technology (Farrell & Saloner, 1985). However this result relies on the assumption of perfect information and short reaction lags.

24.5.3 Information problems can give excess inertia

Farrell and Saloner show that excess inertia is probable if consumers differ in tastes for technology and are uninformed about each other's tastes.

In the example above we assumed that the consumers had similar utility functions. Assume instead that the consumers can differ in the taste of technologies. Some consumers have a strong preference for the new technology some have strong preference for the old and some lie in between these extremes.

Because of imperfect information the consumer is taking a risk by switching to the new technology. The risk is that the other consumer has such a high taste for the old technology that she will not switch to the new – so for her we have that $U_{old}(1) > U_{new}(2)$. If this is the case then it is optimal for both consumers to stay with the old technology.

If a consumer has such a high taste for the new technology that she will switch no matter what – i.e. $U_{new}(1) > U_{old}(2)$ - then the other will follow if this is beneficial for her.

The problem appears if both consumers have preferences like in equation (52) and (53) – they would both prefer the new technology but only if the other one switched. If you do not know the taste of the other consumer you will be reluctant to switch because now there is a real threat that you will be alone with the new technology. This will induce both consumers to wait and see if the other one switches and hence cause excess inertia.

24.5.4 Reaction lags

We can also assume that there is a reaction lag so whoever switches first has to endure a certain period of lower payoff before the other follows – this is a switching cost that is

only paid by the one who switches technology first. This feature makes it optimal for both consumers to wait for the other one to switch first and this gives excess inertia.

We can think of there being a larger number of consumers and for the network effects to set in it is required that the number of consumers who have switched to the new technology exceeds a threshold value T , cf. equation (54).

$$U_{new}(T) > U_{old}(N - T) \quad (54)$$

When the number of switched consumers exceeds the threshold value everybody will follow. The reaction lag corresponds to the time it takes before T consumers switches to the new technology. Excess inertia will arise because consumers have an incentive to wait until it is costless to switch. In this scenario it is also possible that the new technology will never be adopted because of high switching costs.

24.6 Coordination failure and capitalism

We have shown that coordination failures can produce inefficient outcomes and that there is a possibility of ending up in an inferior but stable equilibrium. The possibility is larger when riskiness increases with efficiency or if there is strategic uncertainty. We have seen that an economy can exhibit excess inertia when a new superior solution emerges if there are switching costs and imperfect information.

The problems of coordination failure that we have shown are inefficiencies caused by having atomistic agents. Atomistic competition is a characteristic of capitalism so there is reason to believe that these problems occur in a capitalistic economy. In a planned economy we can avoid coordination failures to the extent that they are known. Either a central authority can order all firms to change strategies at the same time, or we could organise it so that firms have representatives who ensure coordination, by voting on plans that are mandatory for all.

It is possible to let firms in a capitalistic economy coordinate without violating anti-trust regulation. If anti-trust legislation is removed and society thus allows for firms to coordinate, then they would not only coordinate on being more efficient. Private firms would also coordinate as to extract as much profit as they can – because of the profit-motive. So we have a trade-off between an efficient handling of coordination failures and anti-trust considerations in a capitalistic economy. That trade-off does not exist in a

planned economy, as long as we can ensure that firm management has the incentive to do what is in the interest of the owners – the citizens – then we do not have to worry about anti-trust considerations.

The magnitude and frequency of coordination problems are not clear and one could say that the theories and examples we have provided so far are not compelling enough. But by expanding on some of the examples we might be able to show how important coordination failure is in the context of capitalistic and planned economies.

24.6.1 Recessions

Consider the model where the choice variable is production and coordination failure corresponds to a recession. The recession is caused by falling aggregate demand and therefore all firms lower production and investment. In a planned economy a decision could be taken by a central body to raise production and investment and then avoid the recession. If a falling level of business investments is caused by coordination failures then these kinds of recessions could be avoided with central coordination. The problem in a capitalistic economy is that there are too many agents that do not have any means of organizing cooperation.

24.6.2 Inflexibility

The model where a new technology emerges can be expanded to any new equilibrium that is observed. Assume that the economy has been travelling on a certain path for some time and then new knowledge arises which makes it clear that the path is in fact inferior. For example we can imagine that scientists suddenly find that there are environmental problems being created by the current production methods. It could also be any problem that necessitates a major shift in the economy. If this is the case then the atomistic organization of a capitalistic economy becomes a hindrance – the economy is too inflexible. In a planned economy it is possible to make a central decision to change all production methods and thereby solve the problem.

These two examples of inflexibility and recessions help to show how much it can mean to an economy if we firms could coordinate.

25 SUMMING UP ON CAPITALISM AND MODERN ECONOMICS

In this part of the thesis we have used the tools of modern economics to critically investigate a very important institution within capitalism: the profit motivated capitalistic firm.

The focal point of our analysis was to understand which of the two economic systems delivers the highest level of efficiency, or in other words, which economic system can deliver the best opportunities for economic growth. The outset for the analysis was the insight that the observed pattern of long-run economic growth only is possible with growth in total factor productivity. Therefore we examined how the profit motive and the atomistic competition of capitalism affect growth in TFP.

First, In the case of research and development, we showed that the private profit-motivated firm has too little incentive towards conducting research, because the public good nature of knowledge makes investments in R&D less profitable. When patents are introduced to ensure profitability of research investments they also inhibit further research. If a new innovation violates existing patents it can be so costly to retrieve licenses that it is no longer profitable to invest in R&D. Also the incentive for private firms to be secretive inhibits technological progress because of externalities in the production of knowledge. Within a planned economy, firms can be ordered to invest in research even though it is not profitable for the individual firm to do so, and both the dissipation and re-use of knowledge is encouraged. It was thus shown, that a planned economy will perform more research, and do so more efficiently.

Second, we examined whether a capitalistic economy would in fact ensure that costs are minimized. We highlighted that for a firm to actually be cost minimizing three requirements must be fulfilled: an appropriate mental ability of firm-owners, no principal-agent problems and no externalities. It is virtually impossible for these conditions to be met simultaneously and we therefore concluded that it is highly unlikely that the private profit motivated firm would in practice be more cost efficient than publicly owned firms. We then used a simple model to illustrate, that if firms can steal business from one another by spending resources on advertising they would do so. However, on a macroeconomic level the resources spent on advertising, or other investments directed at gaining markets shares, constitute wasteful spending. In an

almost superfluous comparison, the planner has zero incentive to waste resources on business-stealing advertising.

Third, we investigated the ability of the capitalistic firm to exploit efficiencies arising from economies of scale. It was found that the unencumbered market equilibrium yields a socially suboptimal level of entry and that resources are wasted because the multiple entrants all have to incur the fixed setup costs. Limiting the number of entrants will however not ensure an efficient use of resources; by limiting the number of firms, the firms will instead have the market power to extract monopoly or oligopoly rents. In a simple model of strategic interaction we showed that given the presence of constant returns to scale and fixed setup costs the planner will be more, efficient than the capitalistic firm.

Fourth, we looked into the impact profit motivated firms can have on both child quantity and child quality. We highlighted that many of the prime examples of capitalistic countries have great difficulties in ensuring fertility rates at or above the replacement fertility rate. We further made it probable, that social innovations such as socialized welfare and the change from primary or secondary industries towards the tertiary service sector greatly increased the opportunity cost of having children. Since the firms have the incentive to push employees towards working more – as long it is profitable to do so – the capitalistic firm will in effect only serve as to increase the opportunity cost of having children. We then proceeded to model the interactions of a profit motivated firm and agents struggling to make ends meet time-wise. We found that the capitalistic firm, given its myopic profit motivated nature will push agents towards working more and disregard any consequences there may be on the quality of future generations, as long as it is profitable to do so. Since the planner will have to bear the future consequences of her actions, she will instead seek towards ensuring a sound balance between work and family life.

Finally, we examined the ability of the atomistic profit motivated firm to coordinate its actions with fellow firms towards ensuring efficiency. We found that given the existence of multiple Pareto-ranked equilibria there is a danger that firms end up in an inefficient equilibrium. If risk rises with Pareto-efficiency then the probability of coordination failure increase, strategic uncertainty has the same effect. Further, when new knowledge of more efficient equilibria arises it can be difficult for atomistic agents to coordinate on

switching. With the presence of large switching costs it becomes even more difficult to reach the optimal equilibrium. A planned economy can allow for coordination between firms, or simply issue central directives in order to deal with coordination failure. Anti-trust legislation prohibits such coordination in a capitalistic economy.

We have thus shown that, analyzed from various different perspectives, there seems to be considerable inefficiencies in a capitalistic economy which can be alleviated in a planned economy. The atomistic, profit-motivated capitalistic firm may, in its effort to increase profits today, very well have the consequence that the potential of tomorrow is reduced.

26 CONCLUSION

The discussion on capitalism and planned economies has been largely neglected in the economic science since the beginning of the 1990s, and that is very unfortunate. By neglecting the debate on capitalism we prevent ourselves from understanding this key institution in our economy.

The object of this thesis was to show how economics can be used to analyse capitalism and planned economies.

Specifically we asked two questions:

How can economic theory contribute to the understanding of capitalism and planned economies?

And corollary:

How can this understanding contribute to the debate of capitalism versus planned economies?

Capitalism is defined as having the bulk of production organized by private enterprise, while a planned economy is defined by having the bulk of production organized in government institutions. This means that the means of production is privately owned in a capitalistic economy and publicly owned in a planned economy.

In the first part of the thesis, we argued that economics can contribute to the debate on capitalism by providing a basis for a fruitful discussion. Some topics invoke strong

political emotions when they are discussed, capitalism and planning is one of those topics. These political emotions make it difficult to have a constructive discussion that in turn can lead to a better understanding. But we need political opponents to engage in a discussion to be sure that inconsistent arguments are found.

Arguments that rely too heavily on faith or ethics should be avoided because they are not conducive for a discussion between political opponents. When arguments rely on faith we can end up with groups of partisans who choose each their faith – and then the debate is deadlocked. An argument relies too heavily on ethical proposition when participants cannot agree on a common measure on how to assess the worth of the economic systems. When participants cannot agree on such a measurement the debate will also be deadlocked. Economics can provide a basis that can help accommodate a fruitful discussion between political opponents. Most would agree that economic efficiency is preferable, all else being equal, this can be the common measure with which we can compare the two economic systems. With a long tradition of using rigid logic, economics has avoided arguments that rely too heavily on faith.

Empirical determination of causality requires the use of advanced econometrics. If we wanted to determine which economic system is better by means of empirical analysis an agreement on the appropriate method has to be found. It is difficult to imagine that political partisans will agree on a method that produces arguments counter to their case. Instead we focus on logical theoretical argumentation.

In the second part we asked how the economic science has contributed historically to the understanding of capitalism. We covered contributions that both belong to the sphere of economic science and also non-economic arguments that had been presented by highly regarded economists.

Karl Marx relied on the labour theory of value to argue that capitalists are exploiting workers. However, the labour theory of value has been falsified and if one wants to argue that capitalists are not entitled to earn profits, one has to do this with ethical arguments.

The calculation debate, which is the most important contribution from the economic science to the discussion on capitalism, consisted of arguments that relied either too heavily on faith or were simply wrong. The Austrians argument that prices would be

arbitrary in a planned economy was inherently faith-based, and Oscar Lange's defence of market socialism relied on unrealistic neo-classical assumptions.

Roemer presented worker controlled firms as an alternative to capitalism, but because his alternative preserved both the profit-motive and the atomistic competition, these two issues could not be analyzed in his framework. The reasons Roemer argued that worker controlled firms should replace privately owned firms were that this would be better for economic equality and the environment. These two issues have been important mostly for left-wing groups but not for right-wing groups, therefore it is not very conducive for further discussion between political opponents.

Sherman presented an argument where he connected the institutions of capitalism directly with the economic problems of inflation, business cycles and unemployment. Sherman argued that the government can control investments in a planned economy and thereby avoid business cycles. Furthermore he argued that inflationary pressure resulting from unemployment below the NAIRU can be avoided by price controlling mechanisms.

The non-economic arguments are all logically sound. Hayek argued that a centrally planned economy would necessarily turn into a totalitarian regime. However, if it is possible to design a well functioning planned economy this no longer holds. Friedman argued that government activities, in itself, constitute a violation of individual freedom. However, this is an ethical argument and one could just as well feel uncomfortable with private enterprise.

In part three we used the tools of economics to determine whether capitalism or planning would produce the best environment for economic growth. We asked five concrete questions that all had to do with the impact of the two economic systems on TFP growth.

Because many arguments in the literature criticized a centrally planned economy we chose to compare capitalism with a decentralized planned economy. This makes it possible to focus on the important institutions in modern capitalism, namely the profit-incentive and atomistic competition.

We showed that investments in R&D would be more plentiful and more efficiently used in a planned economy than in capitalism. This translates directly into more growth in TFP, more and better goods, and better and cheaper production facilities.

We showed that there is no reason to believe that private firms will be more cost-efficient than publicly owned firms. On the contrary, private firms have the incentive to impose externalities on other agents in the economy if this is profitable. And private firms have the incentive to invest in acquiring markets shares from each other, even though this constitutes wasteful spending on a macroeconomic level.

We showed that there is a trade-off between utilizing economies of scale properly and preventing firms from acquiring too much market power. In a planned economy there is no such trade-off, and this means that scale economics can be fully utilized without risking inefficient provision of goods due to monopoly pricing.

We showed that private firms do not have the incentive to reward parents for spending time with their children. This can inhibit the production of social and human capital as well as inhibit the production of children. In a planned economy the planner can account for the benefit of having high-quality children and induce incentives for parents to spend time with their children.

Finally we showed that problems of coordination failure can exist in a capitalistic economy with atomistic competition. In a planned economy firms can be allowed to coordinate in order to avoid coordination failure. Because of anti-trust considerations this is not possible in a capitalistic economy.

We have presented five arguments that all point to the same conclusion, that capitalism is less efficient than a planned economy.

Does this mean that we have proved the superiority of planned economies? No. We have illustrated that there may very well be large inefficiencies created by the way that our economy is structured, but this is not a call for the introduction of planned economy. This is a call for the further discussion of the consequences of capitalism and planned economies. We find that the economic science is a perfect framework for nurturing this discussion. The use of strict and logical argumentation allows for participants with opposite political emotions to engage in a constructive discussion.

We do not have strong positive political emotions about capitalism. This means that we might have overlooked some things in our argumentation, so we hope that our logic is sufficiently clear such that proponents of capitalism can follow the logic and present arguments in defence of their case. By doing so we hope that the discussion on capitalism will lead to a better understanding of this key institution in our society.

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