The background of the entire cover is a close-up, top-down view of a tree trunk's cross-section. It features numerous concentric, slightly irregular growth rings in shades of light brown and tan, radiating from a central point. The texture is natural and organic, with some darker spots and a small crack visible on the right side.

Giorgos Kallis

degrowth

THE ECONOMY KEY IDEAS

Degrowth

Giorgos Kallis

agenda
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The economics of degrowth

What is an economy and what does it do? This chapter explains how many of us who write about degrowth understand the economy. Our view differs fundamentally from how mainstream economists see the economy: namely, as a circular flow of money, goods and services between firms and households. The interdisciplinary picture I provide here combines insights from economic anthropology, ecological and feminist economics, Marxian and institutional political economy.

First, I will argue that the economy is not something “out there”, an independent system with its own laws of motion. It is a social and political construct: an invention of people in particular societies to represent and organize part of their experiences. This construction is constantly changing and can be contested – it is not carved in stone. But it is embedded in institutions that enact it and materialize it: institutions that are hard to change.

Second, whatever the term “economy” means, this something is material. It involves the transformation of raw materials into artefacts and services. Production is entropic: a portion of the energy used in production is always lost irreversibly as heat.

Third, the engine of the economy is work: work by humans and non-humans. Machines increase the total amount of product that results from a given amount of human work by minimizing losses, or, more often, by complementing human work with the work of nature. But machines do not do work themselves.

Fourth, the end of an economic process is expenditure. Expenditure can be productive, increasing production down the line; or it can be unproductive, pure and final expenditure beyond necessity or use. Societies construct their meaning and purpose around unproductive expenditure.

Fifth, different societies organize production, expenditure and who takes or does what differently. Class relations are the basis of exploitation: they

are imprinted in the institutions of a society, and they are a constant source of conflict.

Sixth, work and expenditure are meant to satisfy the values that a society holds dear. Market value is one among many forms of value. Under capitalism, market value encroaches and colonizes other social values.

I do not pretend I am developing a new economic theory here. Rather, I orchestrate the fragmented theoretical insights that degrowth scholarship uses, I connect them, and then in the next chapter I apply them to explain what growth is, how it came to be, and why it may be coming to an end. Let us start with the first point then: the origins of the concept of economy and its evolution and institutionalization over time.

The invention of the economy

“We must rid ourselves of the ingrained notion that the economy is a field of experience of which human beings have always been necessarily conscious.”

— Karl Polanyi, Conrad Arensberg and Harry Pearson

“[The economy] was an object that no economist or planner prior to the 1930s spoke of or knew to exist... In the sense of the term we now take for granted ... the idea of the economy emerged ... in the 1930s and 1940s.”

— Timothy Mitchell

What is “the economy”?

“The economy” is a concept. You can see a cat, but you cannot see an economy with the naked eye. I did economy when I saved my weekly allowance to buy my first bicycle. I studied the economy at school – when the teacher drew graphs of supply and demand, or talked about a Scottish philosopher called Adam Smith. I am supposed to contribute to the economy when I teach a class and receive my payslip, or when I buy groceries.

But when I teach, I do it also because I enjoy sharing knowledge. When I buy food it is also because I want to cook with friends and enjoy their company. Who decided that all these different human experiences form part of

the same thing called the economy, and that this is the same thing captured by the level of the Dow Jones and by GDP? When were those decisions made? In other words, who invented the economy, and when did they do it?

We tend to think of the economic as the realm of money. But processes of production, exchange or expenditure that involve money in our societies did not do so in other places or at other times. In pre-capitalist societies, what we today understand as “economic” activities were embedded in social institutions: rituals, kinship networks, state or religious mechanisms of redistribution. Markets were small, constrained spatially and institutionally, subordinate to politics and values (Polanyi 1957). In “gift economies”, for example, goods were not traded for profit, but exchanged for reciprocal gifts, institutionalized in rituals such as the potlatch in some Amerindian societies, and governed by values such as prestige, tradition or mutual obligation, rather than profit (Mauss 1954). (Such values operate today as well, when you host a friend in your house for free, or work for reasons other than money – we will return to the question of values at the end of this chapter.)

In the most general sense we can define economy not as the restricted realm of money but as follows.

Economy is the instituted process of interactions between humans and their environments, involving the use of material means for the satisfaction of human values.

This definition is inspired by, but modified from, Polanyi (1957: 248), and it applies to a capitalist, as well as a socialist, or a gift economy. All societies of humans have had “an economy” even if they did not have a word for it.

But caution is needed: an indigenous hunter in the Amazon does not necessarily think he is producing for the economy. The Aztecs did not see their sacrifices as acts of collective consumption. We may study these phenomena in analogy to phenomena in our “economies”, and classify them as “hunter-gatherer” or “agrarian” economies. But the economies of “people without an economy” did not necessarily have the integrity, the purpose or the relationships between the parts that we understand an economy as having.

What we understand as the economic today has crystallized over time, as certain societies started using the term to demarcate emerging phenomena

and the institutions that governed them. The labelling of a subset of concerns as “the economy” coevolved with the creation of a sphere of human affairs to which this label applied. But let us start from where it all began.

The origins of the (word) economy

As with other concepts, those who first used the word economy wanted to communicate a portion of the reality as they were experiencing it in their time and place. The time and place where the economy first appeared was Greece, four centuries before Christ.

Οἰκονόμος was the person who manages the household. The word consists of *οἶκος*, meaning the house or the household, and *νέμω*, which means to distribute or dispense (“*nomos*” is also the word for law). *Oeconomonia* (“economy”), a verbal noun, referred to the proper management of the household. Xenophon’s *Oeconomicus*, a dialogue written in the mid-fourth century BCE, is probably the first treatise in economics. It is concerned with advice to gentry on how to manage their estates alongside philosophical explorations of the meaning of wealth.

The classical Greeks did not start philosophizing about “economy” on a whim, but because of the increasing prominence of money and trade in their society (Seaford 2004). This new reality called for new categories. Philosophers were concerned with the growing power of money and what they saw as the dangers of an unlimited pursuit of profit. Aristotle distinguished between *oekonomia*, the art of housekeeping that he approved of, and *chrematistics*, making money out of money, a pursuit that he dismissed. But as Dale (2018) notes, the philosophers’ concern may also have been self-interested: their interests as part of the gentry class were threatened by the rise of a new moneyed class of merchants.

Rediscovering the classics, monasteries and the Church revived the term economy in the medieval ages to mean the good management of an estate. But starting in the sixteenth century, the domain of the term started escaping the confines of the church estate. Still used as a verbal noun describing the property or “art” of economizing, the term economy was used to signify the proper and efficient disposition of things and people, first within the family and then in the kingdom or national estate. Economy became synonymous with the art of thrift in administration (Foucault 1991). No

longer confined to land, economy now included the management of people, money, things and resources by rulers.

Eighteenth-century moral philosophers like Adam Smith started writing about the laws that govern the “wealth of nations”. “Political economy”, the name given to their field of studies, referred to the art of economy by a polity. If the audience of Xenophon was the aristocrat estate owner, economy being an art for an individual, the audience of political economists were the rulers of empires or nation states. To advise rulers one had to understand better how their “estate” worked. Physicists deciphered the laws of nature, and political economists imagined themselves as deciphering the laws (“nomos”) of economy. Economy became a domain of study – one step before its final transformation from a verb and an art to a noun and an object.

The birth of market economy and market economics

In line with their ideological and class interests, political economists made sense of the new phenomena of the incipient capitalist world that they lived in – a world where workers sold their labour to survive, and where goods circulated for money and profit more and more quickly. In the 100 years of liberalism in Europe (1814–1914), market production and trade were “liberated” to an unprecedented extent from the social controls that previously controlled them, with land, labour and money increasingly treated as market commodities (Polanyi 1944).

The myth of a “self-regulated” market (or, as it is called today, a “free” market) was vital to the liberal project (Polanyi 1944). This refers to the fantasy that, left on their own, markets naturally reach an optimal balance, where supply matches demand and human well-being is maximized. As Polanyi (1944) showed, free markets did not exist historically, and they did not naturally emerge under capitalism. They were instituted with force: capitalists and states dismantled by force the traditional institutions that governed land, work and money.

The liberal period crystallized a new understanding of the economy as the political and material domain of profit- and trade-oriented activity. Polanyi (1957) calls this “market economics” (or to use the discipline’s contemporary term, “neoclassical economics”). Using theories and increasingly

complex mathematical equations, market economics formalized the fiction of the self-regulated market. Initially, the word “economy” still signified a verbal noun: the series of rational economizing choices that agents face when trying to allocate scarce means to alternative ends. But it gradually became a noun describing the domain of such choices: that is, the “interlocking system of markets that automatically adjust supply and demand through the price system” (Block, quoted in Polanyi (2001 [1944]: xxiii)).

Imagining a national economy

With the First World War and the Russian Revolution in 1917, the issue of a planned economy came up. Otto Neurath, a Viennese philosopher and political economist and one of the leading figures of what came to be known as the Vienna circle, was impressed by the war economies of the German and Austrian empires and with how they mobilized and distributed resources. Inspired by the Russian Revolution and the promise of socialism, he started thinking about how an economy could be democratically planned with public deliberation and without market prices. His thesis that a socialist economy can reasonably allocate resources was fiercely contested by Austrian market fundamentalists like Mises and Hayek in what has come to be known as the socialist calculation debate – a debate in which Karl Polanyi also cut his teeth (see Martinez-Alier *et al.* 2003).

Liberal economies crashed, first with the Great Depression and then with the Second World War, and governments stepped in, trying to govern markets, “re-embedding” destructive, runaway markets within social objectives (Polanyi 1944). Governments controlled the money supply and, with taxation, a greater share of national income. During the war they also assumed ownership of productive assets and strategic enterprises. Until then, the economy had mostly referred to private market activity. In the interwar period the novel notion of economy that is with us today emerged. “The national economy” meant the management of the national estate by the government, an estate where the laws of supply and demand operate. National economies were represented as a circular flow of goods and services, investments and savings that the government had to govern for the good of everyone. Economy was a noun designating a new object and system of concern (Mitchell 2011).

The preoccupation with the “wealth of nations” had a long history, but political economists did not conceive wealth as an attribute of a national economy. Planning for war production and monetary interventions to avoid another Great Depression made people think for the first time of a separate, governable system out there called “the economy”. This conceptualization coevolved with new Keynesian theories that delineated and explained the new system and new tools of representing and measuring it, such as the national accounts and GDP. New institutions – the Ministries of National Economy – were founded to govern the economy, which assumed an unquestionable existence in the eyes of those charged with studying and administering it, and gradually, those who lived in it as well (Mitchell 2011). But what do we mean when we say that the economy was institutionalized and imagined?

The economy as an instituted process

By *instituted* I mean that the activities that we designate as economic are always socially organized – embedded in political institutions. This is true for market economies too, since markets are socially and politically organized (consider the complex administrative arrangements and bureaucracies necessary to regulate emissions trading or international trade, or the cultural norms of trust without which no market economy would last long).

Institutions are never neutral. Institutions order conflicting values and interests and they are a domain of power and struggle. There is nothing free or neutral in the institution of an “independent” central bank, for example. The idea that a central bank should govern money supply “free” from political control is as political and value laden as any other idea, crystallizing particular political views about what the economy is, how it should be run and by whom. And yet we often think of the economy as a domain separate from politics – the “free” market as the pure form of an economy, a domain of voluntary exchange freed from government intervention. This, following Polanyi, is an illusion.

First, there is no purely voluntary exchange in a society where power and money are unevenly distributed: those who have more money have more power to determine production and expenditure priorities. A worker with

no access to her means of survival cannot but sell her labour, even if the price is unfair. If workers organize and unionize, they can sell their labour dearly. This is precisely why capitalist interests organize to shape institutions in ways that limit the rights of workers to organize. In what sense is this “free”?

Second, the creation of markets always requires the heavy hand of the state to remove – often through violence – social institutions that limit trade and lending (but also to protect societies from market failures) (Harvey 2003; Polanyi 1944). Laissez-faire policies are policies like any other: they are themselves institutional plans and interventions designed to construct the imagined market economy. Again, there is nothing “free” in any of this.

Third, when the fiction of a free market is pursued to its end, as in nineteenth-century Europe, the results are catastrophic. Labour, land and money are fictitious commodities (Polanyi 1944): that is, they are not produced for market exchange. Treating them like commodities has huge social costs and is prone to failures and crashes. Disembedding the economy from society and politics can never be completed. Negative effects take their toll and social “counter-movements” emerge to re-embed the economy. As Polanyi (1944) memorably put it: “laissez-faire was planned; planning was not”. Planning emerged as societies spontaneously responded to the disasters caused by the market institutions implemented under liberalism.

The market economy is therefore by necessity instituted – as instituted as any socialist, subsistence or hunter-gatherer economy. Each of these is instituted differently, but instituted nonetheless. The liberal idea of an autonomous market system with its own laws of supply and demand, to which society and politics should adapt, is a fiction that disguises the inevitably political choices involved in the making of any economy.

The economy as an imaginary

The word fiction points to imagination. The economy (and particular ideas about what organizational forms an economy should have) is part of the “social imaginary” (Castoriadis 1997). This refers to foundational ideas like

“the nation” that express what we think our world looks like and how we organize it as a result. Imaginaries rest on a system of symbols and “significations” (GDP, supply and demand curves, stock exchange markets) and institutions that materialize that system (the statutory laws that govern the economy, central banks, etc.).

“Imaginary” does not mean unreal. Think of wars in the name of gods or in the name of nations. The god may be imagined, and the flag is just a symbol; but the dead bodies of soldiers are very real. An imaginary provides a culture with the meaning that drives its actions. It is a force of cohesion and common purpose. The imaginary is real both in that it has real effects and in that there are real people who hold it and act because of it.

As an imaginary is instituted, reality is moulded to the ideal. The imaginary then becomes a good representation of its own creation, for as long as the creation works as imagined. The imaginary of a market economy is imprinted in the institutions of a market economy, which in turn produce subjects who behave like the rational maximizers of market economics. Market economics is then validated by a world that it has helped create (Norgaard 2006). We experience life as workers with a limited wage and a cornucopia of goods that exceed our budget – an experience that confirms the market model, when in fact it is the creation of the market model. Our experience would appear awkward to people from societies where markets are marginal and goods are shared or exchanged as gifts.

There is the sense of a trap here, with no room for new understandings of the economy to emerge. But change does happen, and what we understand as the economy today is very different from what we understood it to be 50 years ago (not to mention 2,000 years ago). Change happens because reality bites back, creating a tension between imaginary and experience. The interwar crisis of liberalism was one such generative moment when new understandings and institutions of the economy sprang up.

Human beings are also constantly creating new imaginaries; not as mere representations, but as active intents to change the world (Castoriadis 1997). Those who hold power have an interest in things staying the way they are (and those who explain how things are often close to, and dependent on, those who have power). But creating new imaginaries (in our case, new imaginaries of what an economy is and what it does) is a vital step in unleashing the social potential that can change the world. Let us then start

reconstituting the imaginary of what an economy is, by asserting its material foundations.

The nature of the economy

“Matter matters, too.”

— Nicholas Georgescu-Roegen

The economy is an instituted process driven by imagination. But ultimately it involves humans interacting with material environments to provide for their needs and values. Let me present here some core concepts that grapple with this interaction.

Social metabolism

When I wake up, I take a shower. The water that pours abundantly out of my shower comes from rivers and reservoirs tens of kilometres away from the centre of Barcelona, channelled to arrive inside my home at a moment of my choosing. After showering, I move to the kitchen and turn on the electric stove, powered with electricity generated using gas from Algeria or nuclear power from South Catalonia (which in turn uses uranium from Niger). I mix water with a scoop of organic oats that were probably grown somewhere in Western Europe, bananas from the Caribbean and honey and milk extracted from bees and cows in the countryside of Catalonia, all transported by trucks or boats powered by oil and gasoline from Saudi Arabia.

My body converts my breakfast into the energy that moves me – the rest is excreted. This is my metabolism – the metabolism of my body. But there is also a metabolism outside my body that sustains me, and my way of life. This “social metabolism” includes all the flows and wastes of water, energy and materials – from Catalonia, Algeria, Niger, Saudi Arabia – that make possible my daily metabolism and those of others like me.

My “endosomatic” energy use is the energy my body burns: some 1,500–2,500 kilocalories per day. Our “exosomatic” energy use includes all the energy and materials outside our bodies necessary to move our cars and

trains, heat our homes, or power the tractors that till the land that produces our food. Add all the individual metabolisms of those of us who live in Barcelona and all of the energy, materials and water necessary to produce and transport what we eat and drink, or what heats us and moves us around – that is, add the endosomatic energy to the exosomatic energy and material use of the residents of Barcelona – and what you get is the metabolism of the city.

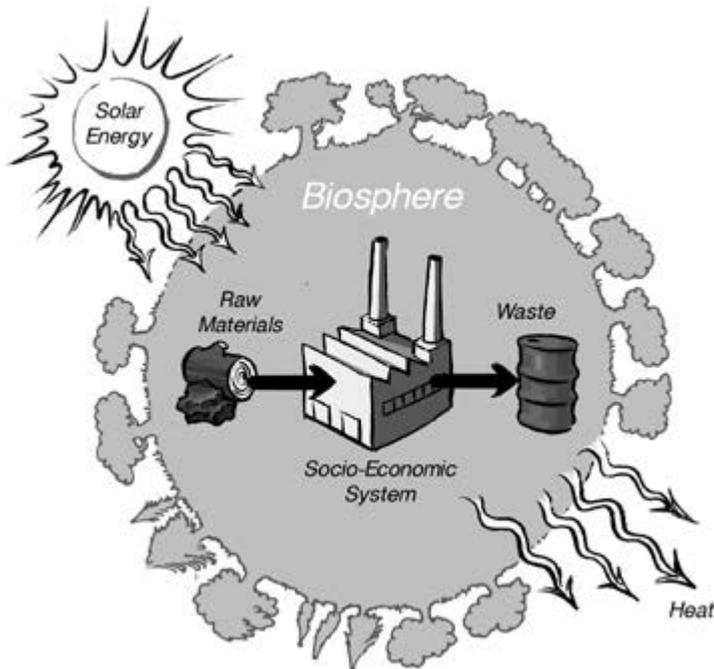


Figure 2.1 Social metabolism.

Whatever the term economy has come to mean, this something has a material basis. The interaction between humans and their environments is, by definition, metabolic. And this metabolic process is irreversible. My body ages with every meal and with every day that passes. I tend towards death and a state of homogeneity with the world that surrounds me. And so does the economy as a whole. This is the law of entropy.

Entropy and the economic process

Think of the hot water in my morning shower – I use the heat and this heat dissipates forever into the universe. I cannot use the same heat twice. The energy of the heat is not destroyed. Energy and matter are never destroyed in a closed system. They only change state – this is the first law of thermodynamics (Figure 2.2).



Figure 2.2 The law of entropy.

When ice melts into a puddle of water, entropy (disorder) increases. Energy is required to turn the water back into ice, like work is required to turn a pile of bricks into a wall.

The second law of thermodynamics – the law of entropy – postulates the irreversibility of all natural processes. Matter and energy within a closed system move towards a state of homogeneity: a state of high entropy. Heat dissipates into cold and this is irreversible. Hot water cools down naturally, but cold water does not heat up without applying energy. Ice melts into water, but water does not freeze without more energy. The universe is a great homogenizer. Gradients decrease: from high to low temperature, high to low density, or high to low concentration (Ayres & Warr 2009). Our goods, like our bodies, decay and become soil. In the long term everything dies. In the meantime, though, nature works hard to produce islands of low entropy on earth (Schrödinger 1943) and we humans try to do the same, creating order in a sea of rising entropy.

Nicholas Georgescu-Roegen (1971) was the first to apply these thermodynamic concepts to economics. The economic process, he argued, is an irreversible process of conversion of resources of high order and quality for humans into useful goods and services, inevitably dissipating large

quantities of high-entropy materials and waste. Waste and heat are material manifestations of increasing entropy. From a thermodynamic point of view, when an economy grows, it accelerates the conversion of low entropy into high entropy. Locally, we decrease entropy by doing work and expending energy – but local order is achieved at the cost of global disorder. Think of the fossil fuels we burned to create ordered settlements – climate change is the reckoning for that disorder.

In *The Entropy Law and the Economic Process*, Georgescu-Roegen (1971) proposed a flow-fund model of the production process. He distinguished between “stocks”, energy and materials like fossil fuels or minerals that can be decumulated; “flows”, stocks used over a period of time; and “funds”, such as labour-power, productive land or machinery. Funds are the agents acting upon flows from stocks to produce goods and services. Stocks can be used at will, but funds are constrained by natural rhythms – there is a maximum number of hours per day that a human can work, and land produces crops only in certain seasons.

Save for meteors or spacecraft, the earth is a closed system for matter, which cannot enter or leave its atmosphere. But the system is open to energy, from the sun (Figure 2.1). Solar radiation, however, is a flow. It has a fixed rate that we cannot control. Fossil fuels are a unique stock of energy whose rate of extraction we control – a bottled photosynthesis gestating in the bowels of the earth for millions of years. Uncork them, though, and there they go, forever. Recapturing and recycling energy from burned fossil fuels is practically impossible as it would require a massive expenditure of energy. Economic activity, Georgescu-Roegen argued, cannot grow perpetually, since mineral stocks and fossil fuels are finite. It will have to decrease (“degrow”) to a scale sustainable by the rate of flow of sunlight.

A solar economy is conceivable, but likely to be different from a fossil fuel economy for many reasons. First, it is likely to be smaller, since a greater portion of the energy that is captured will be spent on capturing and concentrating energy. Stocks like fossil fuels are spatially concentrated and can be extracted, spending less energy. To concentrate the diffuse power of the sun, we have to spend energy and occupy land. Second, the pace of a solar economy is different, dictated by the rhythms of the sun and of the land funds from which it is accessed. Georgescu-Roegen (1971) contrasted the slower

tempo of rural life, structured around the passive reception of solar flow, with the frenetic pace of cities, fuelled by the exploitation of mineral stocks.

Production inevitably produces residual waste. Energy is lost in a steam engine as heat. A huge quantity of soil and materials is discarded for each kilogramme of metals we extract from the earth. Power plants produce electricity but emit carbon dioxide. This entropy is what we understand as pollution. Recycling can reduce the quantity of solid waste, but recycling consumes energy too. One hundred per cent recycling is theoretically possible (if powered by solar energy) but practically impossible, as some energy and matter will always be lost in conversion. An economy can become more circular, but it can never become fully circular since it is entropic.

Economists think of pollution as an externality: an unintended effect external to the market. Their imaginary is that of the fictional market that internalizes everything. From a thermodynamic perspective, however, pollution is the physically inevitable outcome of *every* production process: increasing entropy somewhere is the inevitable effect of decreased entropy elsewhere. Rather than thinking of pollution as an externality, it is more instructive to think of it as the pervasive cost-shifting of business activity (Kapp 1970), a cause of the increasing number of ecological distribution conflicts (Martinez-Alier 2003).

Work, the engine of the economy

What moves society's metabolism? The answer is work – the work of humans, draft animals and machines fuelled with oil. But what is work?

The nature of work

In a physical sense, work is a force operating over a distance. Something that moves a thing from point A to point B. A horse pulling a cart does work. A father carrying or feeding a baby does work. A preacher persuading you to go somewhere does work. Work is intentional energy expenditure that alters the object to which it is directed.

The foodstuffs I eat for breakfast have one thing in common: the work that went into making them – the work of beekeepers, farmers, sailors, bees and soil microorganisms and fossil fuels. Humans work with brains and muscles – our “endosomatic” tools: those that are internal to our bodies. We also work to manufacture machines that do more work for us – our “exosomatic” tools (Georgescu-Roegen (1971), following Alfred Lotka’s ideas (see Martinez-Alier 1990)). We never work alone, though – we work together with cows, bees and other sentient beings to produce milk or honey. And we capture and release huge quantities of potential work stored in inanimate objects, such as the fossil fuels accumulated for millions of years under the earth’s surface. Horses pulled our carts, now oil fuels our car engines.

It takes work not only to produce honey but also to raise, care for and sustain a beekeeper, for example. Beekeepers are born as helpless babies. Their mothers and fathers took care of them when they cried, fed them, taught them how to speak and helped them to walk. Someone caresses and calms down beekeepers when they are stressed, and someone washes their clothes when they are too tired to do so (hopefully they reciprocate when they are less sad or tired). The beekeeper has parents and must help them when they can no longer work, as his kids or peers will help when he can no longer collect honey. The economy, that is, involves all the manual, emotional and intellectual work necessary to care for – and sustain – healthy humans.

A lot of energy is lost in the process of moving or transforming matter – what is left is the “useful work” (Ayres & Warr 2009). Athletes or swimmers optimize their technique by minimizing unnecessary movement and contact of their body with land or water, so that all the energy they expend is energy for moving forward and is not lost in friction. They minimize losses and maximize useful work. The same principle applies to the economy. The scale and speed of production is not determined by total work, but by the efficiency with which expended work is converted to *useful* work.

A lot of work is done in extracting resources that can do even more work. Think of fossil fuels. To extract oil, we expend energy in digging it out. Useful work is net work: the work returned minus the work invested to get it. In terms of energy supply, what matters is “net energy”: the energy that remains after we take out the energy spent to produce it. “Energy return on investment” (Murphy & Hall 2010) is the ratio of energy produced to the energy spent to produce it.

Technology, work and productivity

“The mechanical buffalo is made of iron ore and coal ... and feeds on oil.”
— Georgescu-Roegen

Physical exosomatic artefacts or tools (“machines”) do work for us. We humans create these tools. We conceive and rearrange matter in ways that fulfil our purposes. Any new technology or tool – the steam engine, say – involves materials (the metal and the parts that make the engine proper) and knowledge: the human ideas, abstractions or experiments that led to the conception of a steam engine.

Tools make us more “productive” – meaning that for every hour we invest in a task, we get more work out than we would have without the use of the tool. This gain does not come out of thin air though. It has two sources. First, the tool may improve the efficiency with which we convert our work into useful work. Think of a wheeled cart. In ten minutes a person can haul a sack in a wheeled cart five times farther than in a cart without wheels (or travel the same distance in a fifth of the time). The wheel reduces friction. It increases fivefold the amount of useful work extracted from a fixed amount of muscular work spent.

Second, new tools can mobilize additional sources of work on top of our own work. A person can saw ten boards per hour with a hand saw or 100 boards per hour with a machine saw,¹ the equivalent of ten hours’ worth of work without the machine saw. The machine does not save nine human hours of extra work magically. What powers the saw is energy from fossil fuels. When we invented the machine saw we did not invent a new source of power. We did not become more efficient at what we were doing. We simply harnessed natural energy to do work for us: nine hours of human work equivalent on top of the one hour of actual work we were putting in. Horses or machines increase productivity but not the “productiveness” of human labour (Ashford 2010): it is not that we are doing things better, it is that we are getting those horses and machines to do more work for us.

Machines can complement our work by doing much more of the same, or they can substitute for us entirely and do all the work on their own (with a non-human source of power), as in the case of a washing machine, an ATM

1. I take this and other examples in this section from Ashford (2010).

or a robot (Ashford 2010). Machines may even do work that humans could never do with their muscles alone: we could never fly aeroplanes with our muscles (but aeroplanes, as with everything that does work, need energy – kerosene in this case).

Consider a pizza oven: the example used in economics textbooks to explain how production combines labour (the baker) and capital (the oven) (Figure 2.3). An ecological economist like myself will instead tell you that a pizza cannot be produced without energy and flour. Humans cannot heat the oven alone. When we assemble tomatoes and flour into the higher-order form of a pizza, entropy is produced: heat escaping the oven, unavoidable leftovers (the flour that stays on the kitchen table), and so on.

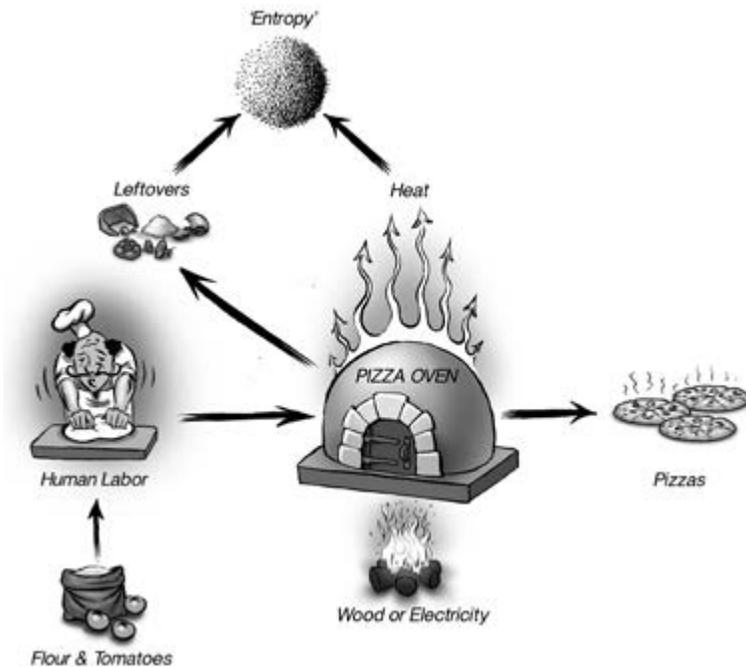


Figure 2.3 The pizza production process.

The oven itself is a product, just as much as a pizza is. It was also produced by combining human and non-human inputs, with heat lost along the way. Georgescu-Roegen's epigraph at the beginning of this section reminds us

that a machine not only “feeds on oil”, but is also made by oil (and iron). Tools do not only do work. They also require work, energy and materials to manufacture, maintain and repair them. A wheel reduces friction, but at the cost of the wood or aluminium that goes into making it, and at the cost of the work put into cutting down the trees, mining the aluminium and manufacturing the wheel.

For an economy to grow, the extra work that a tool (like the wheel) does during its lifetime must be greater than the work that went into making it. The overall process, however, does not escape thermodynamics. It is entropic: an unavoidable share of energy and work is lost irreversibly as heat during the manufacturing of the tool.

We should distinguish here between physical and social technologies, and between quantitative and qualitative technological change. A steam engine is a physical technology – the Taylorist model of factory production is a social technology. A different way of organizing or dividing work can increase “productiveness” (see page 30) by increasing the efficiency of conversion of a given amount of human work into useful work, but it does not mobilize additional sources of work (unless, that is, the new form of organization allows us to use physical technologies that would not otherwise be usable).

Consider a five-person team in a pizza restaurant. If all five people chop tomatoes together, put pizzas in the oven together and serve the customers together, it will take much more time to deliver pizzas than if one chops the tomatoes, another puts the pizza in the oven, and another cleans the dishes and throws out the rubbish. This is the basic idea behind Adam Smith’s “division of labour” as the source of a nation’s wealth.

Consider again our favourite pizza parlour and the difference between a new electric stove replacing a wood-fired stove and a new pizza recipe being added to the menu. Both are new “technologies”: different ways of doing things based on new knowledge. But the new recipe only rearranges existing ingredients without adding new sources of work. The stove instead mobilizes the power of electricity. The electric stove can cook more pizzas per hour. The new recipe does not speed up the process, it only adds a new flavour – and in contrast to the stove it does not require any more resources (flour, electricity, etc.). Daly (1996) distinguishes qualitative development, as is the case with a new recipe, from quantitative growth, such as a new stove churning out more pizzas faster and faster.

Now consider a social technology: a new way of organizing the cooks. This might bring quantitative growth, if it speeds up cooking. Or it might change the quality of the work experience of the cooks or the taste of the pizza. Let us keep sight of these distinctions as they are often confused in debates about new technologies and the prospects of decoupling output from throughput – debates that we will encounter in chapters 4 and 6.

Embodied work, energy and materials

A machine embodies all the human labour, energy, land and materials that went into its making – both directly (the aluminium and iron in an engine, say) and indirectly (the work, food and energy expended in training and supporting factory engineers).

The energy embodied in a product is its *emergy*. *Emergy*, spelled with an m, is the available energy that has to be used up directly and indirectly to make a product or service (Odum & Odum 2008: 67). We call this embodied energy, but it is of course dissipated energy: energy spent to produce a good or service.

In ecology, more complex organisms embody more energy from simpler forms. The steak dish in front of us *embodies* all the energy that went into making the poor cow that we are eating, including the energy that went into making the plants the cow ate.

Services are thought of as less materially intensive than manufacturing. But there is nothing immaterial about services. They embody all the energy, work and materials required to produce them. Web services require computers and servers. Think of all the energy an engineer uses to learn how to make computers, all the solar energy and fossil fuels that went into making the engineer's food, and so on.

The land (or ecological) footprint of a good or an activity is the amount of land required to support it. My footprint as a professor includes not only the land that my office and the lecture theatres occupy but all the land necessary to produce my computer, feed me and clothe me, move me between home and office. My material or my water footprint are the materials or water embodied in all the products I consume – the water that went into irrigating the cereals and bananas I had in my breakfast, for example, or the water I used for my shower.

Products and services embody not only human labour, but also knowledge. Knowledge has a qualitative dimension that cannot be reduced to physical work, hours of mental work or calories burned while thinking. One hour of Newton's work is not the same as one hour of mine.

Yet even someone like Newton was “standing on the shoulders of giants”. Without the work of Greek philosophers or Arab scholars who developed and passed their ideas to the West, Newton would not have come up with his way of seeing the world. The Greek philosophers contemplated while their slaves worked. Newton had peasants grow his food and women to pamper him. His theories were the product of the intellectual climate of his time and of myriads of conversations with others and things he heard or read about. Accumulated knowledge, as accumulated work therefore, is a commons. It is a social product (with an individual touch no doubt), and is impossible to distinguish the individual contributions embodied within it.

Surplus and its expenditure

“Economics is how lifeforms organize their enjoyment.”

— Timothy Morton

“The book ... I am now publishing did not consider the facts the way qualified economists do... I had a point of view from which a human sacrifice, the construction of a church or the gift of a jewel were no less interesting than the sale of wheat... A ‘general economy’ in which the ‘expenditure’ (the ‘consumption’) of wealth, rather than production, was the primary object.”

— Georges Bataille

We have seen how we mobilize our work and that of non-humans to transform environments in ways that satisfy our ends. But what are these ends? Is the purpose of the economic process only reproduction and satisfaction of basic needs? Later in this chapter we will talk about values. But before we do, let us think of the literal *end* of the economic process: expenditure. I follow Georges Bataille here, a French philosopher and novelist, and his unique theory of the “general economy” – a theory brought into degrowth debates by Italian sociologist Onofrio Romano (2014a,b; see also D’Alisa *et al.* 2014b).

The economic condition

Humans always mobilize more work than is necessary for their mere survival (Bataille 1949). In the general economy of life, the sun sends an excess of energy to earth, from which the effervescence of life springs (Bataille 1949). This abundance is the universal economic condition, not scarcity (save for occasional and temporary shortages). By abundance I mean that there is always an excess of energy available over and above what is necessary for our reproduction and survival, not abundance for the satisfaction of unlimited wants and desires.

For Bataille it is “not necessity but its contrary, ‘luxury’ that presents living matter and mankind with their fundamental problems” (1949: 12). The basic – call it human or economic – problem that each society faces is what to do with its “excess energy”, how to expend its surplus: “Excess energy requires a ‘sovereign’ use ... on the basis of a philosophical intention and of a political prospect... It is an ‘accursed share’: it places humans before the question of the meaning of life” (Romano 2014b: 165).

Bataille’s distinction between servile and sovereign expenditure reminds us of the Aristotelian distinction between slavish life – the life of the slaves who had lost the free disposition of their movements and activities – and life in freedom: that is, life concerned with the beautiful, that which is “not the necessary nor the merely useful” (Arendt 1959). For Aristotle, a life of beauty is one devoted to bodily pleasures, political matters, and contemplation, inquiring simply for the sake of inquiring (Arendt 1959). Arendt called this “*vita activa*” (active life): time and energy expended in endeavours that are not serving need or utility.

Civilizations leave their mark with such non-useful, or unproductive, activities and expenditures – think of the pyramids built by the Egyptians, the sacrifices of the Aztecs, the churches of the medieval era, or the monasteries of Tibet (Bataille 1949). Social relations form around these expenditures, and it is the expenditures – think of the pyramids – that mark for each society their imagined purpose. For the Aztecs, “all their important undertakings were useless: their science of architecture enabled them to construct pyramids on top of which they immolated human beings ... they were just as concerned about sacrificing as we are about working” (Bataille 1949: 46).

This is not an answer to what the human ends are. But we have an answer to how humans form their ends, and this is by expending their

excess energy and work. Actualizing Bataille, Romano (2014b) argues that the search for meaning can be so elusive and tormenting that simply wasting one's energy can be a relief. Think of the excess energy spent jogging or dancing. Unproductive expenditure is the end, not because it satisfies some superior motive but because it relieves the pressure of having to find such a motive. Expenditure is the end of the economy: not the goal, but literally *the end*.

Romano talks of wasting ourselves without utility in endless discussions about the meaning of life, or negating our own importance in a self-destructive night of booze or in sexual surrender into the other (prominent themes in Bataille's novels). The soul of life, he argues, lies in the unproductive expenditure of the excess energy that torments us looking for relief (Romano 2014b). The denial of our own self-importance, the denial of working only for things that are necessary and useful – this is how we relieve the unbearable weight of our being. Romano, after Bataille, calls this *dépense* (meaning “expenditure” in French, but it can also, interestingly, be interpreted as de-thinking or un-thinking).²

Humour is an example of *dépense*: an absurd, out-of-context comment, a self-deprecating joke, an observation that denies our own importance or the importance of a situation, a joke that removes our façade and asks that we are not taken too seriously. Life takes place while we are not busy making necessary or useful things. Life is a good joke, a hug, making love, praying or meditating with others or debating in the agora.

Expenditure and *dépense* are not just the domain of “consumption”. The superfluous work of a craftsman, the artistic expression of a cook in her food, or the “unproductive time” spent playing with your child – all these are anti-utilitarian expenditures at the moment of work. Such unproductiveness is the essence of what we perceive as “creative”, or un-alienated, work: work that is not repetitive, forced, functional and useful, but is instead superfluous, experimental, voluntary, donating – akin to Arendt's active life. Un-alienated, creative forms of work are what we often think of as leisure (Skidelsky & Skidelsky 2012).

2. Romano uses the term *dépense* both for any unproductive expenditure and for unproductive expenditures of the de-thinking or self-deprecating/denying sort, whereas I will use it more strictly for the latter and keep the term “unproductive expenditures” for the rest.

If Georgescu-Roegen's thermodynamics made us aware of our irreversible path to death, Bataille's reminds us that in the meantime we are tormented to do something with our lives. Life and death are two sides of the same coin of the universe: the life of one being is the expenditure or death of another. From Georgescu-Roegen's theory we can conclude that without fossil fuels the extraordinary production and expenditure of our societies will likely end; from Bataille's we can see that no matter how little we produce after oil is over, we will always produce more than will be necessary for the mere survival of those who will have survived. And the problem of what to do with this excess will remain. Make love, not war, seems a sound principle.

Productive expenditure and crises

Productive expenditures direct surplus to the increase of production; unproductive expenditures expend it irreversibly. Directing surplus to production or to the development of means of production, such as research and development of new technologies, mobilizes more work, and in turn creates more surplus. Growth is the outcome of this process of accumulation – more surplus begetting even more surplus.

The accumulation of excessive surplus, however, can become a problem. In the general economy of life, the over-accumulation of surplus energy and organic matter – in a forest, say – finds relief in a fire where excess vegetation is burned. In capitalist economy, as Marx and Keynes have shown, the over-accumulation of surplus wealth and capital without sufficient demand for expenditure or outlets for investment ends in crises, with the surplus devalued and destroyed. Accumulated surplus presses for relief: crises, destructive wars or huge spending programmes are ways (some better than others) of expending surplus (Bataille 1949).

Expenditure of surplus and social organization

Surpluses are often distributed very unevenly. While Greek philosophers contemplated and lived an active life, slaves cultivated their lands and women cleaned their houses. The unproductive expenditure of

surplus becomes a signifier of status, because privileged access to surplus reflects a privileged position in the division and social hierarchy of work. Aristotle distinguished aristocrats from slaves precisely in that while the former were “free” to spend their time contemplating and pursuing beauty, the latter had to produce and reproduce, the realm of necessity and bodily needs (Arendt 1959).

The ability to waste displays power. Bataille writes about Aztec merchants and how they would throw splendid banquets and festivals for other high-class merchants, “displaying the favour of the gods who had given them everything”. By spending money, merchants affirmed their wealth, joining the high-class club. The wealthier a merchant was, the more he would spend, even sacrificing slaves for the occasion: “By giving, one exhibited one’s wealth and one’s good fortune (one’s power). The merchant was the man who gives” (Bataille 1949: 65). This is what sociologist Thorstein Veblen (1934) called “conspicuous consumption”, observing how wealthy Americans also signified position by spending their wealth on things that had no usefulness other than to signify their position.

In an egalitarian society the surplus would be expended collectively and a share of the active life made available to all. In unequal, class societies divisions are marked precisely by the distribution of unproductive expenditure. Social position is signified and reified by conspicuous expenditure. The power to give, the power to spend and waste without utility, the power not to work out of necessity, not to have to deal with one’s bodily needs or fluids – this is the ultimate display of position, power and class. To the question of class in relation to the social division of surplus we now turn.

Exploitation, class and conflict

“Class counts.”

— Erik Olin-Wright

Up to now I have used the generic “we” when talking about production or expenditure. But it is never “we” who produce and consume things together, certainly not in the capitalist societies that I live in. There are people who live next to rubbish dumps and there are people who live in gated communities. There are people who appropriate more of the common work and the gifts of nature than the work and gifts they give back.

Exploitation

One person or group exploits another if it benefits at its expense (Olin-Wright 2000). This can happen if person or group “A” appropriates the work of person or group “B” for its benefit without returning to it its due share; if it appropriates a greater share of the commons and the free gifts of nature than its fair share; or if it shifts the costs of its activities to group B, ending up with a larger surplus than would otherwise be the case.

Some Marxists reserve the term exploitation for the exploitation of wage labour in capitalist production: the structural feature whereby the owners of means of production pay workers less than the value of their product (or, more precisely, pay them only what is enough for their reproduction). Other Marxists use it for the transfer of surplus in any class-divided society, not only a capitalist one. I use it in the latter sense, and I also extend the definition beyond class-based appropriation to include other forms of undue transfers based on race, gender or ethnicity, including the unpaid appropriation of resources and the services of ecosystems. We might distinguish two special cases of exploitation here: “expropriation”, the forcible acquisition of another’s work, land or resources, as in slavery or colonial theft (Fraser 2016); and “appropriation”, the out-of-the-market extraction of resources or unpaid work, as is the case with fossil fuels, ecosystem services or care work (Moore 2015).

Exploitation often involves violence, as when Europeans uprooted Africans from their lands by force, moved them to plantations across the Atlantic and expropriated their labour, spending the minimum necessary to keep them alive (and not always that). Europeans expropriated the land of indigenous peoples in the Americas with astounding violence. Violence was used in Europe too, as in seventeenth-century England when the commoners were expelled from lands and forests they had been able to access for generations to become a “reserve army of labour” working in the factories set up in the cities.

Exploitation is sanctioned institutionally and organized formally, as in the laws that enforced the dispossession of the commoners, classifying as theft their attempts to access what had previously been their commons. Other more recent examples are unfair trade agreements or institutions that regulate labour markets and restrain collective bargaining. Ideology is used to justify exploitation and make it seem natural and inevitable (Harvey

1974). This is what scientific theories that purport to prove the inevitability of poverty and inequality do, “proving” the naturalness and superiority of the wage labour system, the fairness and mutual benefits of “free” trade or the natural origins of the inferior social position of women or ethnic groups.

There is exploitation within social formations and exploitation between state formations, as in the case of imperial centres and colonies, or rich and poor nations (this distinction is harder to sustain in a globalized and transnational capitalist class that cuts across borders (see Sklair 2012; Robinson 2004)). Europeans colonizing Africa, Asia and the Americas exploited locals by expropriating their work and appropriating their land and resources. At the time of the conquest, nobody (with the exception of some missionaries) was arguing that conquest would be good for the development of America. With colonialism, and especially after its formal end, the idea of “development” – helping ex-colonies help themselves – sustained unequal colonial relations of dependency and maintained a cheap flow of labour and resources from the periphery to imperial centres. Today, trade masks continued “unequal exchange” of work and resources between ex-colonizers and ex-colonies and the original and continued violence that sustains these exchanges (Hornborg 1998). Rich European and North American nations owe an ecological (and carbon) debt to ex-colonies, from which they drained, and continue to drain, resources and ecosystem services (Martinez-Alier 2003; Srinivasan *et al.* 2008).

Within societies, exploitation is organized along lines of class, gender and insider/outsider distinctions: distinctions based on economic position, origin, clan, ethnicity, race or nationality. The appropriation of the reproductive and caring work of women is a constant in patriarchal societies, and so is the exploitation of the work of foreigners, often of different race, expropriated in the extreme case of slavery. Social hierarchy systematizes exploitation and codifies positions in the division of work and expenditure, making them seem natural to new generations.

In India’s caste system, for example, the higher caste (the Brahmins) consists of those who traditionally engaged in scriptural education and teaching. Below them are those working in public service and administration, then those who engage in business activity, then the masses of semi-skilled and unskilled labourers, and finally, at the bottom, the “untouchables”: those that clean, who are not to be touched because they are in contact with filth. Here, as in other societies, we find a hierarchy

that mirrors Aristotle's and Arendt's hierarchy of activity. Reproductive (bodily) activity and those who perform it is at the bottom, productive (utilitarian) activity is above that, and at the top is political, philosophical/scientific or artistic activity – activity beyond the realm of necessity and use, an active living maintained for the privileged few who appropriate the surplus produced by the rest.

As habits, mannerisms, clothes and tastes form around the different types of activity and expenditure, caste or class appear as natural traits that are passed from generation to generation. Class appears as a natural, and deserved, trait of its members, not as the social construction that it is. Tastes, education and manners, established as superior, make the privileges of those that hold them appear natural and well deserved. High-class people look high class. They have the bodies and accents of their class, they live like people of their class, hang out in places accessible only to members of their class, spend time with friends from their class. From there it is not a far stretch for common people to start thinking that aristocrats must be biologically different – recall the popular idea that royals had blue blood.

Class

“Class” refers to the hierarchical organization of individuals on the basis of their economic position. Georgescu-Roegen (1971) says that in all complex societies there are people engaged in administration (“the service class”) and people doing the work (“the working class”). Production with exosomatic tools is a social undertaking and requires administrative services without which it cannot function (1971: 309). These services do not produce palpable results and it is impossible to value them. This is “the perennial taproot of the social conflict in any organized society”. The service class is in an inferior position because it does not produce directly, but it can exaggerate its unquantifiable contribution. Those who control the administration of private or public assets occupy the upper social echelons – together with the priests and knowledge-brokers who help them establish a “socio-political mythology” about why they deserve what they take (Georgescu-Roegen 1971: 310).

Karl Marx – with Engels – instead defines class in terms of control of the means of production. He identified two classes under (fully developed)

capitalism: capitalists, or the bourgeoisie, who own the means of production; and workers, or the proletariat, who “own” nothing but their own bodies, which they have to sell to capitalists for a wage (Marx 1844). Workers are exploited because capitalists pay them back what is necessary for the mere reproduction of their labour power, but this labour power produces more than is necessary for its reproduction. This surplus of net or useful work stays in the hands of the capitalists. Without the prospect of capturing this surplus, capitalists would never invest. Capitalists – regardless of whether they are good or bad people, whether they are greedy or not – *have to* draw as much surplus from labour as possible otherwise other capitalists will out-compete them. Exploitation is therefore an intrinsic and systemic feature of capitalism, not a moral failure that can be corrected.

Hierarchical organization is not unique to capitalism – Indians have their caste system, and ancient Athens had aristocrats, metics, freedmen and slaves. In non-capitalist societies, positions were relatively fixed, depending on one’s ancestry and place of birth. Under capitalism money buys class, and while one’s origin can help in obtaining money, it does not fully determine one’s fate. This potential mobility propels capitalism’s dynamism.

By the second half of the twentieth century, capitalism had developed more fully at the imperial centres, but Marx’s two-class polarization could be maintained only at a high level of abstraction (Olin-Wright 2000). Trying to account for the proliferation of managers, professionals and small business owners that did not fit into Marx’s two-class scheme, Olin-Wright proposes a 2 x 2 matrix of class positions depending on whether one is self-employed and whether one supervises the labour of others. If someone supervises and is self-employed, they are a capitalist; if someone supervises but is employed by others, they are a manager. If they do not supervise but are self-employed, they are part of the petty bourgeoisie; if one neither supervises nor is self-employed, they are a worker.

Sociologists have complicated the picture by arguing that political power and social or cultural status and prestige also matter, and it is not necessarily – or always – the capitalist class that holds those. Peasant-studies scholars and feminist economists like Gibson-Graham (2006) have shown that within developed capitalism, older pre-capitalist classes like the peasantry persist, while new positions – such as people who care for one another and their commons outside the market – are constantly created (Carlsson & Manning 2010).

A definition of capitalism is needed here – we have used the term loosely until now. Capital is money in movement: a process of circulation where money is used to make more money (Harvey 2011). Capital is money invested in “an enterprise with the expectation of getting a good return” (Appleby 2011: 7). *Capitalism* is a political, cultural and economic system dominated by – and geared around – the imperative of investors to turn a profit (after Appleby 2011). To various extents, capitalist economies differ among themselves, but also share certain institutional attributes: wage labour and private ownership of the means of production; bank-credit and bank-credit money; widespread market exchange and private enterprise production of commodities (Ingham 2013).

As with any other social formation, capitalism reproduces its order through its expenditures (Romano 2014a,b), but it has two distinctive features.

First, unlike any other mode of social organization, under capitalism a great share of expenditures is directed to productive activities or development of knowledge and machines that support and accelerate this productive process. The first end of capital is, therefore, the endless reproduction of capital: growth for growth's sake.

Second, as capitalism produces ever greater quantities of surplus, the stability of the system requires a concomitant expansion of unproductive expenditures. This must be done in a way that will reproduce social order. The second end of the system, then, is private consumption: expenditure that reproduces the capitalist class hierarchy. Under capitalism, unproductive expenditures are individualized, privatized and commercialized (Romano 2014a) – think of private parties, yachts, professional sport, commercialized hobbies or salaried politics. Privatization reproduces the order of the system by providing the “demand” that absorbs what is “supplied”, but also because it naturalizes the ideology of the system (the successful individual with the aristocratic capacity to spend beyond use and necessity). A hierarchy of conspicuous consumption and distinction maps the class hierarchy and acts as a constant motor of competition. Those “below” try to catch up and move to the positions of those “above”, displaying their ascendance with sanctioned forms of (wasteful) expenditure. Capitalism draws its immense power by the connection it forges between economic behaviour required for its reproduction – competition, relentless work, conspicuous consumption – and (an elusive) pursuit of meaning through private expenditure and commodified/privatized *dépense*.

Conflict

“The history of all hitherto existing society is the history of class struggles ... oppressor and oppressed, stood in constant opposition to one another, carried on an uninterrupted, now hidden, now open fight, a fight that each time ended, either in a revolutionary reconstitution of society at large, or in the common ruin of the contending classes.”

— Marx and Engels

A sense of injustice (and empathy for the injustices experienced by others) is a major driver of individual action and fuel for collective organization. Exploitation is a constant source of grievance, especially when the satisfaction of the very basic necessities of those being exploited is at stake. Think of the wars of independence in colonies or the struggles of workers and women.

Conflict is a motor of history. As the powers that different people wield are rearranged, new social formations emerge, together with new patterns of producing, expending and distributing surplus. In Marxist thought, the conflict between capitalists and workers within capitalist economies over the distribution of surplus takes centre stage. But it is not the only conflict, since surplus is not only drawn from the exploitation of wage labour but also from the appropriation of nature, from the appropriation of the uncompensated care work performed mostly by women, from the often gendered or racialized shifting of costs, and from the unequal exchange of work and resources between core and peripheral nations (Moore 2015; Hornborg 1998).

Alongside the workers’ movement there are therefore the anti-racist and anti-colonialist movements, and the women’s or social and environmental justice movements. These are different manifestations of a common struggle: that is, the struggle of all those who have been – and are being – dispossessed of their means of production, reproduction or subsistence (Harvey 2011).

This struggle is uphill since the exploited and the dispossessed, without access to their means of production or subsistence, depend on their exploiters for their survival. This is why trade unions often take up a reformist stance: the wages of workers depend on the overall stability and

growth of the economy, which allies workers, to an extent at least, with the interests of the capitalist class. The capitalist class, in turn, control a greater portion of society's surplus, meaning it can yield more power and influence over government, which has a monopoly over the use of means of violence, which it can use to protect the exploiter's interests. By controlling surplus, exploiters can also direct significant resources to those who produce knowledge, who then "prove" the mythology that the ruling class deserves what it takes.

Ecological and economic conditions do change, and societies are never static. Political regimes also fail to perfectly map economic power – representative democracies may allow openings that tilt power and surplus away from the capitalist class. Even in the most oppressive of regimes, a ruling class may lose its legitimacy and collapse when one least expects it. And there are always dissidents who work to produce alternative stories that challenge the dominant mythology and create counter-hegemonic ideas about how the world works and whether it is fair or not. We will return to the question of change in chapter 5.

Values, value and money

“What is a cynic? A man who knows the price of everything, and the value of nothing.”
— Oscar Wilde

“Money, the equation of the incompatible.”
— William Shakespeare (quoted by Karl Marx)

Values versus value

“Values” are principles of behaviour, or moral standards, that govern the way we live our lives. We organize our lives, feelings and desires around the pursuit or futhering of values (Graeber 2013). “Value” is instead associated with money and the relative worth of something.

Values are “incommensurable”: one cannot exchange beauty for truth or x units of freedom for y units of equality. They are “weakly comparable”,

though: a society can weigh the types of freedoms it might curtail in the pursuit of equality (Martinez-Alier *et al.* 1998). As anthropologist David Graeber (2013: 224) explains, “that we use the same word to describe the benefits and virtues of a commodity for sale on the market (the ‘value’ of a haircut or a curtain rod) and our ideas about what is ultimately important in life (‘values’ such as truth, beauty, justice), is not a coincidence”. Precisely because beauty, truth and freedom cannot be exchanged or reduced to their market “value”, we designate them as “values”. Values demarcate that which cannot and should not be converted into money (Graeber 2013).

Values can be measured, of course, as when we devise indices of freedom or evaluate knowledge with grades or impact factors. When we quantitatively compare two different entities along a value metric, we commensurate them (Espeland & Stevens 1998). “Commodification” is a particular process of commensuration. Different entities are compared in terms of their value by being converted into commodities that are exchanged in the market (Kallis *et al.* 2013a).

Values are articulated through value systems (churches, schools, markets). Different social networks are identified around the sets and orders of values they espouse. “Value-articulating institutions” (Vatn 2007) are the spaces in which societies can democratically compare incommensurable values. Indeed, politics is precisely about articulating, comparing and ordering incommensurable values and value systems (Graeber 2013). Value making then depends on the hierarchy of power between social networks with different values (Banet-Weiser & Castells 2017).

Under capitalism, multiple values and value systems coexist (Banet-Weiser & Castells 2017). But the propensity of capital for self-valorization – that is, the relentless pursuit of ever more monetary value propelled by competition – generates an expansionary dynamic that colonizes other values and limits space for value articulation. “Value” expands not only by increasing the quantities of valuable things produced, but also by bringing under its institutional realm entities and functions that previously were governed by other value systems.

But what is “value”? This is one of the most basic questions of economics, and the one that has occupied economists the most. The answer, I will argue, remains as elusive as ever (unless you are a devoted disciple of either market or Marxist economics, which I am not). I am entering terrain here with

which I am less comfortable. What follows, then, is a discussion of different theories of value, first the neoclassical theory of value based on utility, and then the labour theory of value and the ecological theory of value, based on labour and energy, respectively. The concepts and debates I introduce here will be useful when, later in this book, and especially in chapter 6, I discuss whether value can be decoupled from resource throughput.

Utility and the neoclassical theory of value

For neoclassical (market) economics the economic value of a good depends on its utility. Utility is revealed in markets (or in a survey, if there is no market) by how much consumers are willing to pay for a good (Hanemann 2006). Economists do not distinguish between value and values. All values boil down to one value: namely, “utility”. The assumption is that on some ultimate level we are all pursuing the same sort of thing: utility, or usefulness. If we care for others or the environment, if we believe in God, even if we like pain, this must be because we derive some utility from doing so, otherwise we would not.

If usefulness is what gives value, then why are diamonds so much more expensive than water? This was a question early neoclassical economists faced when they tried to replace the older theory of value based on labour – according to which diamonds have more value in exchange because it takes more labour to extract them than water – with their own theory that was based on utility. Economists tried to overcome this hurdle by asserting that market value captures the “marginal”, not the total, utility of a good. There is so much water that the last drop of water – which will be used for, say, watering the lawn rather than drinking – is much less useful than the last diamond, which, because it is scarce, does not lose its value (Samuelson & Nordhaus 2010: 122; see also Box 2.1). Neoclassical economists thought they had assimilated the older, labour theory of value, according to which the price of a good reflected the labour that went into it, by showing that in a self-regulated market the ratio of prices of two goods equilibrates the ratio of their marginal utilities with the ratio of their marginal labour costs. So, they argued, it does not really make a difference if one arrives at value via utility or via labour (Daly & Farley 2004, chapter 8).

BOX 2.1 THE SO-CALLED “DIAMOND–WATER PARADOX”

This refers to the fact that diamonds are much more expensive than water even though water is much more useful than diamonds, since one dies without water but can live without diamonds. For those developing a utility theory of value, whereby prices represent relative usefulness, this was a paradox that had to be explained away. For the classical labour theory of value (see below), there is no paradox: diamonds have a lower “use value” but a higher “exchange value”, because it takes more work to extract them.

For someone who has studied economics, the explanation that the paradox is resolved by the theory of marginal utility becomes common sense through repetition. But does it stand up to closer scrutiny? Saying that the marginal utility of diamonds is higher because diamonds are scarcer is equivalent to saying that it costs more to mine diamonds than it does to collect water, which is the same as saying that the labour that goes into collecting water is less than the labour that goes into mining diamonds.

The fact that the utility derived from the last diamond is higher than the utility derived from the last drop of water, which will be used to water your lawn, also demands an explanation. It is not clear why having a shiny stone in your ear is more useful or pleasurable than having a greener lawn. The response that it is not for us to judge this and that utility is revealed in the preferences expressed by people in the market, i.e. by their choice to the going price of diamonds or not, leads us to a tautology. If prices alone reveal the relative utility of goods, then we can never know whether prices indeed reflect utility, we can only assert it.

At first glance, diamonds do not have any use at all. Their only use is that they signal the wealth and social position of the person who wears them. The pleasure one derives from diamonds is the pleasure of having the capacity to possess something that is expensive that others cannot possess. It is the pleasure of class and power (a pleasure specific to a specific society where wealth is unequally distributed). Again, the pleasure or utility of diamonds is intimately linked to the fact that it costs more to extract them. It is this cost that makes them positional goods and gives them value. If diamonds were abundant and everyone could have them, no one would want them. If the work necessary to extract diamonds were close to zero, their perceived utility would be close to zero too.

The conditions of perfect markets with full information under which this result is derived are very restrictive and have nothing to do with the real world. In reality:

1. Markets are often oligopolistic or monopolistic and those who control them charge rents.
2. Information is never perfect and advertising intentionally skews it.
3. The institutional set-up in which one expresses preferences changes these preferences (Vatn 2007).
4. Costs external to the market can be huge and are hard to calculate since they often involve things without economic value. When incurred in the future they depend on the rate at which we discount present costs – the importance we give to future generations is a moral question with no technical answer (Spash 2008).
5. Not all goods are, or can be, market goods: it is very difficult to separate, own and trade a portion of the uncertain flow of a river, for example (Bakker 2003).
6. Poor people have less disposable income with which to express what is valuable to them in the market: prices therefore depend on distribution (Spash 2008).
7. A market is structured by institutions (Polanyi 1944), and it is institutions and laws that ultimately determine the price of goods: the value of a house, for example, is not the same in a city with rent controls as it is in a city where capital from all over the world can speculate on housing.

The utility theory of value has never been tested and scientifically proven. No one has ever measured usefulness, pleasure or utility to test whether they correlate with prices or willingness to pay (Sagoff 2008). Claiming that values are revealed as prices is a tautology, since we cannot know the values separately from the prices. We observe prices constantly, but we cannot plausibly know how far from, or close to, equilibrium they are since we can never know what these ideal prices would be, given that we do not live in a perfect market and that if we were to try to come close to it, it would be a disaster, as Polanyi has explained. Neoclassical theory is then a normative theory that dictates that we should change institutions in the mould of a fictional market in order to have our values revealed. This is ideology at its purest.

Marxism and the labour theory of value

Market economists used the utility theory of value to claim that workers are paid fairly for the marginal value of their contribution. The Marxist critique of the market theory is that by staying on the surface level of wages and profits, it hides who really does the work and who appropriates the surplus. If one scratches below the surface, Marx argued, then it is clear that wage-workers are the ones creating value for the market.³ In that, Marx was building on the classical, labour theory of value. If commodities are exchanged, he claimed, then they must have something in common, and the only thing they have in common is the labour that went into making them. The value of a commodity, then, is the “socially necessary labour time” taken to produce it (the average labour time that goes into producing shoes and tables in circumstances of average skills, tools and productivity, not the “concrete” labour that goes into producing a specific shoe in Mallorca or a specific table in Sweden). The exchange value ratio of two commodities is the ratio of their socially necessary labour times (living and “dead” labour, i.e. including the labour embodied in machines). This determines the “exchange value” of a commodity. On the market, then, the value of a good or service ultimately comes down to the proportion of the total pool of salaried labour that is invested in producing it.

This “value”, value for capital, is different from the “use value” of the commodity. Use values are incommensurable (Douai 2009). It is capital and exchange in markets that reduces incommensurable values to their common denominator, labour time, and it is only from the perspective of capital that nature or care work do not have value, simply because they are not exchanged in the market (Douai 2009; Foster & Burkett 2016). The only way capital values nature is by turning it into a real or hypothetical commodity.

The “exchange value” of Marxian economics, like the equilibrium prices of neoclassical economics, cannot, however, be empirically observed. One

3. Apart from volume 1 of Marx’s *Capital*, sources that I have found useful for understanding the labour theory of value are Fine & Saad-Filho’s (2010) *Marx’s Capital* and Harvey’s (2010) *A Companion to Marx’s Capital*, with its accompanying online course (<http://davidharvey.org/reading-capital> (accessed 31 January 2018)). Geoffrey Kay’s (1979) *The Economic Theory of the Working Class* is the reference that most clearly presents the theory for the uninitiated.

can accept that labour goes into commodities like one can accept that the commodities have some usefulness, but one cannot measure either the time that goes into them or their usefulness.

Ecological versus labour theory of value

A blind spot in the labour theory of value is its treatment of the unpaid work of animals, fuels, household workers, workers in the informal sector, or forced labour. All these categories of work are treated analytically as distinct from wage labour. Only wage labour creates surplus value for capital according to Marx's labour theory of value. These other forms of labour are accounted for in other parts of the edifice of Marx's theory. The work of resources, for example, is categorized as rent accruing to the owners of land. The reductions in wage labour time that fossil fuels or unpaid work enable are classified as an "increase in productivity" (see the exchange in Kallis & Swyngedouw (2017)).

Separating analytically salaried labour from unpaid labour is fine as a theoretical convention. Marxist theory isolates and theorizes about what is unique under capitalism: wage labour. It explains in this way how relentless competition to draw more out of workers leads to social crisis as wage labour encroaches on the free time that workers use to reproduce themselves (Foster & Burkett 2016), or to economic crisis as capitalists substitute workers with machines, stripping themselves of their source of surplus and reducing the power of people to buy their products (Harvey 2011).

A theoretical convention, however, is not reality. There is no material basis for assigning priority to wage labour. What is common, physically speaking, in two commodities that exchange is not just salaried labour. They embody energy, matter and unpaid labour too (that we cannot calculate these does not mean that they have not been expended). For capital, these are equally important sources of surplus and value in exchange: the more of them there is, the less salaried labour time is needed. When a capitalist makes a profit, he does not care if he exploited salaried or unpaid workers or appropriated a surplus from photosynthesis or fossil fuels.

In response, some ecologists developed a theory of value that mirrored the labour theory, linking the exchange values and relative prices of

commodities to their “energy”, the energy embodied in them (Odum & Odum 2008). Calculating the living and dead energy embedded in actual goods is, however, as unrealistic as calculating the labour that went into them. And it is impossible to derive prices from emergies, since many factors intervene to determine prices: monopoly rents, capital productivity or demand. A poisonous mushroom has lots of low entropy embedded in it, but no economic value (Georgescu-Roegen 1971). A Picasso painting is not expensive because it took Picasso many hours to paint it or because he burned more calories than I did during my art classes. In other words, labour expenditure and low entropy (or emergy) are necessary, but they are not determining conditions for the value something has in market exchange.

Marxists cannot transform exchange values to prices, and ecological economists cannot transform emergies to prices. We may postulate in both cases that there is a baseline of exchange value determined by labour time (or emergy) and that real prices fluctuate around it, but this is equivalent to simply saying that labour time and low entropy matter. Where does this leave us? Does this mean that it is impossible to come up with any meaningful theory of value? It depends.

That a labour or energy theory of value cannot predict prices is not a deadly blow against them. No theory of value measures value or derives prices from it – the neoclassical economist tautologically asserts that prices reveal values. The question is whether a theory of value illuminates aspects of reality to which we would otherwise be blind. A labour theory of value illuminates aspects of capitalism: will this theory gain or lose by integrating other forms of labour into its scheme? Revolutionaries in Marx’s time may have worried that by allowing unpaid labour to enter the picture they would let capitalists off the hook. If value for capital is not produced solely by salaried workers, but also by other sources, then it could be possible, unlike what Marx predicted, that exploitation of workers would ease if capital at some point drew more value instead out of machines and other sources of work. In a way this is what happened for a while in the West after the Second World War, allowing working standards to improve at the expense of nature or unpaid workers in other parts of the world. A theory of value that is apt for our times may have to integrate the different forms of value creation that capital appropriates (see Box 2.2 on the Podolinski debate).

BOX 2.2 THE PODOLINSKI DEBATE

The debate about integrating energy into a labour theory of value dates back to the work of Sergei Podolinski, a Ukrainian revolutionary and proto ecological economist, who lived at the end of the nineteenth century (Martinez-Alier 1990). Podolinski, an admirer of Marx, noted that what human labour does is capture and appropriate energy that comes from the sun, which would otherwise be dissipated without use. Podolinski attempted an early calculation of the net energy (or energy return on investment) of agriculture. He shared his results with Marx, who read them and commented favourably but died a few months later. Engels, who was more sceptical of Podolinski's work, found the energy accounts interesting but was critical of attempts to base the labour theory of surplus value on energy expenditures (Martinez-Alier 1990; Foster & Burkett 2016).

The reception of Podolinski's work by Marx and Engels has become a core point of contention between ecological and Marxist economists. Martinez-Alier (1990) argues that in the cold reception of Podolinski's work by Engels an opportunity was lost to bring socialist and ecological thinking closer together, developing energy and material accounts of the economy. Foster & Burkett (2016) instead agree with Engels: energy accounting is practically impossible as one can never calculate all the quantities of energy embedded in goods and services and derive exchange values from those.

This is correct, but it is a strange critique to come from Marxists, given that it is the same critique levelled against the labour theory of value by mainstream economists, i.e. that it is impossible to calculate the labour time that goes into commodities and derive exchange values from those. Ecological economists concede that it is impossible to explain exchange value or derive prices from the energy that went into making a good (Martinez-Alier 1990; Georgescu-Roegen 1971). But it is also impossible to derive prices from labour time, or from the pleasure people get from goods. The question is not whether we can derive prices from some separately observable quantity (we cannot), but whether a particular theory of value illuminates and explains phenomena that we otherwise misunderstand.

Foster and Burkett convincingly claim that Marx's labour theory of value already incorporated some thermodynamic and energetic concerns. Marx thought of labour time and surplus value, they argue, in terms of the difference between the energy workers embedded in products and the energy capitalists had to pay them to secure their reproduction (Foster & Burkett 2016). According to Marx, however, the source of surplus value was not the

appropriation of energy from the sun, as Podolinski (and ecological economists after him) suggested, but the encroachment of capital on the free time of workers, drawing more and more energy out of them.

Foster and Burkett argue that an important distinction for Marx is the distinction between productive labour in general and productive labour from the standpoint of capital. The work of a horse or a slave is productive, but it is not productive for capital. Only salaried labour, they argue, is productive for capital.

Without coal or the unpaid work of slaves in the colonies, however, Manchester's cotton producers would have produced barely any profits. If one defines surplus value only as the surplus derived from salaried labour, and exchange value as the ratio of salaried labour in goods, then by definition slave labour or energy work do not influence surplus or exchange value and they are not productive for capital. But this is just a matter of theoretical convention. In reality, unpaid and non-human work affect the exchange ratios of goods. If instead of using gasoline I have to use 1000 paid workers to pull a car, then obviously its exchange value will change. Energy does affect value in exchange (even though not exchange value, as defined by Marxists). From the capitalist's standpoint, it does not make a difference if a salaried worker, a slave or an animal does the work that sustains his surpluses and profits.

In my view, if one wants to understand how capital works and why it has not yet collapsed, despite competition and the tendency of competing capitals to exploit workers as much as possible, it is wise to bring all forms of exploitation and appropriation into the picture rather than treat one (paid labour exploitation) as central and the others (nature and non-wage labour appropriation) as peripheral, assigning them to the realm of use values, or treating them as exogenous forces that influence capital productivity (Kallis & Sryngedouw 2017).

Some argue that we do not need a theory of value: values are incommensurable and should remain so (Hornborg 2017). The point is not to find a single theory of value but to develop new value-articulating institutions in which incommensurable values can be deliberated and compared (Martinez-Alier 2003). This is a reincarnation of the socialist calculation debate in 1930s Vienna and the call of political economists like Neurath or Polanyi to consider the economy as a whole and aggregate different values through social processes (Martinez-Alier 2003).

I agree. However, market value is a reality and we cannot wish it away – we have to explain it and we have to understand how it forms if, for example, we want to argue that it cannot grow indefinitely on a finite planet. Under capitalism, market value constantly colonizes other values. Groups who defend other values organize to protect them and to open up spaces of value articulation (Martinez-Alier 2003). But unless we explain how market value works and expands, how it gets its power and how this power can be stopped, we are left with a normative and ethical argument for incommensurability swept away by powerful capitalist processes (Kallis *et al.* 2013a). I do not propose here a political–ecological–economic theory of value, market value and prices, but I still feel one is needed.

Money

What is money and how does it work? Money is a token representing the equivalent form of value embodied in commodities. Money does not embody this value. Little work goes into the making of the paper for a dollar bill compared with its value. But it is a socially acceptable form of representing value, exchangeable for goods that embody an equivalent amount of value.

Many values come to be represented as tokens other than money (Graeber 2013). Certificates and diplomas represent the value of education, metals the value of honour, and retrospective exhibitions the value of art. The importance of our labour becomes real to us in a socially recognizable form through these tokens, which are both material and symbolic (Graeber 2013: 225–6). In our minds, the symbol of value becomes the value itself, generating the very power that it represents. The university degree, like money, becomes an object, and the pursuit of that object motivates students and workers to carry out the very creative actions whose value these tokens represent (Graeber 2013).

As Marx (1988 [1844]) noted, money is a confounding and contradictory token that turns things upside down: “He who can buy bravery is brave, though a coward... I am ugly but I can buy the most beautiful of women [sic]. Therefore I am not ugly” (138–9). Money is the “fraternization of impossibilities”, rendering things that are by nature incompatible and contradictory exchangeable for one another (139). Money makes it possible to

purchase human time and ecological work, permitting an abstract equivalence between incommensurable qualities (Hornborg 2017). It is money that made exchange possible rather than exchange that naturally led to some form of money (Hornborg 2017).

Indeed, money did not evolve out of barter. There is no historical evidence of widespread barter economies (Mellor 2010). Debt and credit appeared before money, which appeared before barter (Graeber 2009). In Mesopotamia, money was used to count credit and debts (Graeber 2009). Sovereign rulers issued money to pay for goods and services and then retrieved it through taxation (Mellor 2010).

Money is a social convention. It is typically created by fiat. Trust in the value of money can be backed by a state authority that guarantees its peg to the price of a real commodity or its convertibility into something valued – say an equivalent amount of gold physically stored in the authority’s coffers (Daly & Farley 2004). Nowadays, from national currencies to bitcoins and ethercoins, there is nothing to back up money but faith that someone else will accept it in exchange for other money or goods (Daly & Farley 2004).

To hold money, everyone has to give up a real asset – everyone except the issuer, that is. The one who creates the money and spends it first gets a real asset in exchange for a paper token. The difference between the monetary value and the negligible commodity value of the token – the profit to the issuer – is called “seigniorage, in recognition of the lordly nature of this privilege” (Daly & Farley 2004: 249). Seigniorage accrued to the feudal lord, the king or the sovereign. Now it goes to private banks, which the state then has to pay to borrow money for public spending (Mellor 2010).

We think of banks as intermediaries, borrowing from savers and lending to investors, charging something along the way for screening good from bad lenders or for taking on the risk that someone may not pay them back. In fact, private banks create money out of thin air and lend it with interest (Daly & Farley 2004). Loans credit deposits of previously non-existent money to the accounts of those who receive them (Mellor 2010). Under fractional reserve banking, banks are required to store only a fraction of their deposits as reserves: typically an amount sufficient to settle the difference between daily deposits and withdrawals. With a 10 per cent reserve requirement, for every new cash deposit of \$100, a bank (or the bank system as a whole) can create \$900 of new money (Daly & Farley 2004).

Production for use is self-limiting. One produces a commodity, sells it for money, then uses the money to buy another commodity. Money acts as a means of exchange between commodities of the same value. But production for profit starts with money, which is invested for producing a commodity, which is then sold for more money (Harvey 2010). The source of surplus cannot be other than the work that the capitalist appropriates from paid and unpaid workers, or from nature. Yet money hides this relation of exploitation.

The logic of producing for profit is very different from producing for use. Money in search of money can follow its own mad path, irrespective of the needs of real people, which are incidental to the multiplication of money (Harvey 2010).

Money seems as if it is a truly creative power, able to convert imagined wishes into actual existence. If I want a particular dish but I do not want to walk to get it, money delivers it to my door (Marx 1848). Unlike physical stuff, the growth of money seems to have no apparent limit. The capitalist circuit where money begets more money reinforces this fantasy. But money ultimately represents value. In the long run it can grow only if this value grows, otherwise money loses its value (inflation) or debts accumulate.

Money can be anchored to a real physical thing: gold in the era of the gold standard, or electricity in the case of bitcoin. But money does not follow the laws of thermodynamics. It can be created by fiat or as debt; and it can be destroyed when currencies plummet. As a symbol, money is expected to increase at the rate of interest at which those who hold it decide to lend it. But the real economy cannot be forced to increase at the pace of the interest rate (Martinez-Alier 1990).

In theory, lenders lend to real projects that can pay the debt back, so there is a connection between bank lending and the real economy; in practice, lenders seeking profit lend to whoever is able to pay back the profits they need in the short term. The gap between interest rates charged by those who control scarce capital and the growth potential of the real economy has been a perennial cause of crisis and civil conflict, from the Mesopotamians and the Greeks to the Romans, and medieval Europe (Hartley 2018; Graeber 2009). Unless relieved by colonial expansion, or more recently fossil-fuelled growth, the accumulation of debt ends with peonage, revolutions or jubilees. From Solon to the Christian Church and Islam, attempts to control lending with interest were swept away over time as the profit interests of the

powerful bent rules (Hartley 2018). In our times, fossil fuels have allowed a constant expansion of both money and value. But “you cannot permanently pit an absurd human convention, such as the spontaneous increment of debt (compound interest), against the natural law of the spontaneous decrement of wealth (entropy)” (Soddy 1933: 30).

Recap

This chapter introduced and explained concepts that will help us see the economy in a new light in the rest of this book.

From historians and anthropologists I took the idea that the economy is an imaginary that institutes and refashions reality, always imperfectly, to suit its imagination. From ecological economists I took that whatever the economy might be, this something is always material, governed by the law of entropy and driven by work. After philosophers like Bataille and Arendt I proposed that the end of (economic) life is expenditure beyond the necessary and the useful. Finally, Marxist political economy gave us a language in which to talk about the social division of production and expenditure, the exploitation of some by others, and the conflict this exploitation engenders. Ecological economics, anthropology and Marxist theory let us see the difference between value and values, they help us understand how value in a capitalist economy is created from work – human and non-human, paid and unpaid – and how capital propels the inexorable colonization of values by value in the form of money: a colonization that can be resisted or reversed by purposeful collective action.

Figure 2.4 sketches a rudimentary model of the understanding of the economy developed here. Humans, appropriating the work of non-humans and the free work of the sun, work to produce. Work goes into production and “reproduction”: that is, care for other humans and our habitats. We use machines to produce, and these machines are products of human and non-human work. Out of the total product, a portion satisfies biological needs and reproduces the species. In addition, a certain portion is, or should be, returned to “reproduce”/preserve/restore nature. The excess product not used for reproductive purposes is the surplus that is expended. Part of this surplus goes into productive expenditures, new machines that can mobilize more human and non-human work to produce more; and part of it is

expended “unproductively”, beyond the realm of necessity and use in the pursuit of meaning and the making of society. Unproductive expenditures include expenditures in leisure and play, politics and philosophy, friendship and love, and pure *dépense*, wasting to be wasted and be relieved. And during the process of production and expenditure a significant amount of work and energy is lost as heat and waste, or entropy.

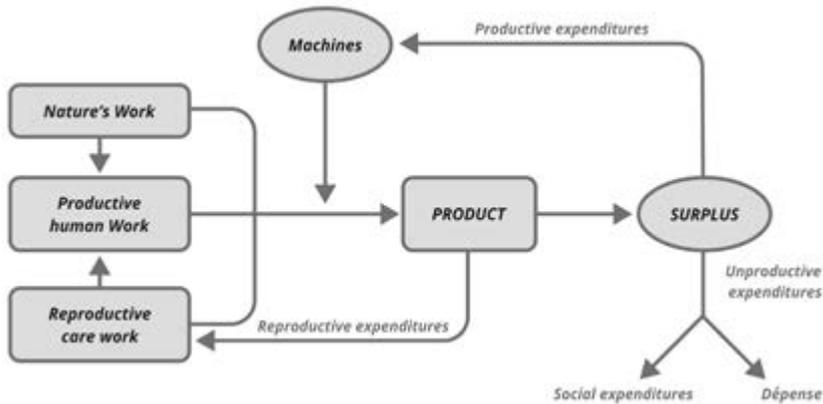


Figure 2.4 A general scheme of the economic process.

This general model applies to different models of social organization. The circulation of capital is a subset of the general economic process, albeit the one that sets the tempo and regulates the allocation of resources and expenditures in contemporary societies. Capital includes the subset of economic activity that takes place through wage labour (paid work), the owners of the means of production (that are not the wage-workers) owning the product, and appropriating the surplus. This “surplus value”, though, which is the surplus extracted from the exploitation of wage labour, is a subset of the total surplus commanded by the owners of the means of production – the latter also includes the surplus appropriated from nature, and from various forms of unpaid work and care labour. Under developed capitalism, alongside the circulation of capital there still exist other forms of economic production (voluntary, subsistence, not for profit) that are not part of capital accumulation – these can be appropriated by capital and can renew it (albeit at the cost of losing their free subsidy), or they can form bastions of alternatives to capital.

Using the concepts explained in this chapter, let us now try to make sense of the central phenomenon of interest in this book – economic growth – and reflect on its trajectory, its stumbles and its fate. That is, let us revisit the origins of growth from a degrowth perspective.