Profit theory: a new macroeconomic analysis

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Abstract

Profit and its investment in productive activities lie at the heart of modern monetary economies. Indeed, it is thanks to profit investment that fixed capital is produced and used by companies to increase the number of consumption goods and, ultimately, to increase the wealth of households. Yet, despite economists' full understanding of corporate gains from a microeconomic standpoint, economists are far from sharing a common theory of macroeconomic profit. In this book, an assessment is made of profit theories since 1874, the year that marked the advent of so-called mainstream economics. Following an analysis of bank money, a discrete-time theory of profit formation and economic growth is then proposed. Possibly the main conclusion of this inquiry, monetary authorities should distinguish distributive payments from those transactions that define the creation of new income. Thus, a reform of the system of national payments is advocated, aiming to keep record of all production-based wealth.

Keywords: production; consumption; investment; monetary systems; monetary policy
JEL codes: E21; E22; E23; E42; E52

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Foreword and acknowledgments

> Adventures do occur, but not punctually.
>
> E.M. Forster (1924) *A Passage to India*

This work is a personal retake of Bernard Schmitt's monetary theory. A student of Joan Robinson and Piero Sraffa at the University of Cambridge, UK, at the end of the 1950s, Schmitt became a highly respected economic figure, although also often ignored by the academic world during the last 60 years. Since time made it impossible for me to meet Bernard Schmitt personally, my research is based exclusively on his writings and on explanations provided by some of his closest students and colleagues.

To be true, I guess Schmitt would have likely rejected my use of mathematical symbols. Above all, seeing as how no explanation of amortization is given in this book, despite the high attention paid by him to capital replacement, he would have probably labelled my research as incomplete. My choice was not made arbitrarily, though. Following a stock-flow consistent study of monetary and real payments, rather than studying amortization, I decided to stress the importance of distinguishing between distributive payments and those payments that, on the contrary, are at the origin of new income. This is my way, at least in this book, to uphold the reform of the system of national payments advocated by Schmitt.

Some parts of this work have been published in Carrera 2015 and Carrera 2016. I also delivered lectures about this work during the annual meetings of the Canadian Economic Association in 2014 and 2016 and the Eastern Economic Association in 2015 and 2016. My research was undertaken between 2012 and 2016 in Canada, France, Italy, the United Kingdom, Spain, Switzerland, and the United States.

Introduction

Man, as well as other animal species, makes use of raw materials in order to manufacture a certain number of utensils and machine tools that are functional to daily activities. Interestingly, it must be observed that the human kind is the only, or among the very few, species that *produce* tools *to produce* other tools (Georgescu-Roegen 1986: 247-248). Since the second half of the XVIIIth century, productive techniques have much improved, and, quite often, at a hectic pace. History is full of examples of this. One may think, for instance, of the relative short time that passed by between 1903, when the Wright brothers piloted the first powered aircraft, and 1969, the first time of Man landing on the Moon. The improvement of techniques – technological progress – has likely been cause and consequence of mass production. Automobile and pharmaceutical productions are clear examples of such a phenomenon. Large-scale production would not be possible without the aid of instrumental capital (or fixed capital): 'machines to make machines to make machines…', as Schumpeter put it (*ibid*.). Several studies have been carried out on mass industrial production and on technological progress. In fact, experts (economists, philosophers, engineers, historians, etc.) paid notable attention to the way in which instrumental goods have been created and accumulated by human societies over History. In particular, *physical* capital has generally been researchers' object of study. Differently to consumption goods – goods traditionally conceived of as goods of daily use –, instrumental capital is generally identified with the whole of those tools (small utensils as well as big machines) employed in the production of consumption goods and other instrumental goods. Both categories – consumption goods and capital goods – are almost always univocally conceived of as physical objects. Small is, instead, the number of scientific works in which both categories are studied from both the *physical and* the *monetary* standpoints. In our research, we seek to study productive activity of consumption goods – hereafter called also wage goods – and fixed capital –

or capital goods. We will propose a positive (and normative) analysis of productive activities from both a real (physical) and monetary (numerical) perspectives.

In particular, we aim at addressing an old issue in economic theory: namely, the formation of profit and its monetary realization at the macroeconomic level. '[T]he existence or monetization of macroeconomic profits is a puzzle that has raised serious considerations, and one that many economists have attempted to resolve' (Rochon 2009: 57). In this work, it will be argued that profit has a twofold nature, being real and monetary, and plays a fundamental role in the formation of fixed capital.

We propose here a study of profit and capital formation that was first carried out by Schmitt (1960, 1966 [1975], 1975, 1984, 1986, 1998), and further developed by Cencini (1982, 1984 [2013], 1988, 1997, 2001, 2003, 2005, 2015) and Rossi (2003, 2005, 2006, 2007, 2009). See also, for instance, Cencini and Rossi 2015, and Cencini, Gnos, and Rossi 2016. Similar lines of inquiry, although differing from the one proposed by Schmitt, can be found in Parguez (1975, 1996, 2001), Barrère (1979, 1990a, 1990b), and Graziani (1989, 2003), among others authors (Gnos 2013: 23). At the end of the 1950s, Bernard Schmitt became acquainted with Keynesian economists at the University of Cambridge, England. Being supervised by Richard Kahn, Dennis Robertson, Joan Robinson, and Piero Sraffa, Schmitt got in touch with notable scholars, such as Pierangelo Garegnani and Amartya Sen, among others. Schmitt had begun developing his study of monetary economies a few years before, as a doctoral student at the University of Paris I. It was the time of the academic controversy between the United Kingdom and the Unites States over the functions of production and technical progress. In 1956, Robert Solow had published his famous neoclassical model of economic growth in the *Quarterly Journal of Economics*. In the same year, Nicholas Kaldor proposed his Keynesian model of growth in *The Review of Economic Studies* and, in 1957, he went on to write about the same topic in *The Economic Journal*. What we now call the *monetary theory of production* (MTP) of circuit imprint, that is to say, an integrated approach to money and output, dates back to that time (although the MTP was first coined by Keynes as the title of a draft of the *General Theory*). The theory of

the monetary circuit, which is studied here, is the point of arrival of lengthy research into political economy. A research begun by economists more than two and a half centuries ago – more specifically, since the publication of Quesnay's *Tableau économique* in 1758 (see Meek 1962) and Adam Smith's *Inquiry into the Nature and Causes of the Wealth of Nations* (1776 [1981]). In order to understand more fully the foundations of the analysis developed here, we first propose a study of bank money and we develop an historical discourse on the contributions of major economists to the theories of profit.

Chapter I regards the nature of money. Thought of as a commodity by neoclassical economists, money is "paramount" for proponents of so-called "monetary analysis", including 'post-Keynesians, but also supporters of the monetary circuit approach as well as a number of Sraffians, Institutionalists and Marxian scholars' (Rochon and Rossi 2013: 211). The concept of money advocated by these economists is functional to the analysis of profit (on this matter, see Schmitt 1975, Graziani 2003, Cencini 2005, Lavoie 2006, and Rossi 2007). According to the theories of the monetary circuit, authored preeminently by Schmitt (1960, 1975, 1984, 1986, 1998), Parguez (1975, 1996, 2001), Barrére (1979, 1990a, 1990b), and Graziani (1989, 2003), bank money – broadly speaking, money in general – is not of a physical nature, but a pure symbol, a number without intrinsic value – an idea that, it will be argued, was latent in classical writings already. In particular, it is thanks to the numerical attribute of money that goods and services are made homogeneous. Namely, the monetization of production is made possible by the interaction between workers, firms, and banks: workers' bank accounts are credited with wages by banks upon request of a firm, when a production of consumption-goods or capital-goods is carried out. Thanks to the concept of the monetization of production, economic theory arrives at a thorough study of bank money, which is void of any intrinsic value. In particular, the rejection of the conception of money-as-commodity – evident in the modern era of electronic means of payment – leads one to set aside the idea that money, intended as a commodity in itself, may intervene in an exchange between itself and other goods. Economic theory is then based on the ex-

change between physical goods (and services) and their numerical form; i.e. the global product and bank money. The analysis of bank money is required here because money is pivotal in understanding the very nature of macroeconomic profit. Starting from the observation that money and output are strictly bounded together, thanks to banks intermediation, one can develop a proper analysis of profit from both the physical and the monetary perspectives. Thanks to the study of bank money, we will lay the groundwork for an analysis of profit formation (and realization) in full respect of the (classical) equivalence between values and prices: otherwise said, we aim to understand whether profit is positive or nil at the macroeconomic level. At first sight, observation might lead to claim that national or macroeconomic profit is zero. Is there room for another interpretation? We will seek to investigate this issue over the next chapters.

In Chapter II, we review major contemporary theories of profit, drawing on some of the most influential literature. The chapter starts with an assessment of the theory of profit started out by Léon Walras with his *Eléments d'Economie Politique Pure* (1874 [1965]). It is worth noting that in the neoclassical theory, where money is thought of as nothing more than a type of commodity, global output and money have real, physical attributes. Profit is also conceived as real, and, broadly speaking, it is identified with interest. An assessment of the neoclassical theory, from its outset to current models of growth and distribution, follows. We then make a study of Keynes's profit theory, analyzing *A Treatise on Money* (1930a,b [1971]) – hereon the *Treatise* – and *The General Theory of Emplyment, Interest and Money* (1936 [1964]) – hereon the *General Theory*. We observe that, at first, Keynes paid attention to the study of windfall (or inflationary) profits. In a later phase of his professional life he focused his attention on so-called normal, entrepreneurs' profits. Further on, we also make an assessment of Keynesian studies since 1936. In the first place, we analyze the neoclassical versions of the *General Theory* and other models that have been developed in the attempt to include Keynes's theory into the neoclassical theoretical framework (see for instance Harrod 1937; Hicks 1937; Meade 1937; Lange 1938; Modigliani 1944). These models can be found, for instance, in neo- and new Keynesian models. We then arouse our interest in

post-Keynesian theories. Attention is paid to profit in seminal and most recent post-Keynesian studies. Authors close to Keynes noted the central role of households' savings as a source of global investment. Indeed, saving has been traditionally identified with the sum of savings from wages and savings from profits (see for instance Kaldor 1956) or the sum of workers' and capitalists' savings (see for instance Pasinetti 1962).

A new analysis of national profit is proposed in Chapter III. In our analysis, we share the idea that 'to explain the existence of profits at the macroeconomic level […], we must do so without relying on the existence of the State or of an external sector' (Cottin-Euziol and Rochon 2013: 463). By rejecting the concept of money-as-commodity, one discovers that national profits are the result of the real and monetary distribution of a share of the national product from the hands of households to firms. Profit is thereby conceived *both* in real terms *and* in monetary terms. Within this analytical framework, the most relevant effect of profit creation on economic analysis is of high importance: profit, conceived as company income, is created as real stock and simultaneously realized in its money form. We shall argue that profits are a (company's) income of *substitution*, and, as such, their amount is positive. Wages and profits, therefore, are not complementary to each other, i.e. profits are not in a residual or additive relationship with wages. From this viewpoint, profits are a type of income that is distributed to firms. It is argued that in modern economies national output is equal to the sum of wages paid to workers inclusive of the profit to be *invested* in further productions of goods or services. This reasoning touches upon the very foundations of the equality between demand and supply. Profit formation is the starting point of the analysis of investment. The goal of profit investment in new productions of instrumental goods is, in fact, the formation of capital goods and their accumulation in the long-run.

Chapter IV suggests a normative analysis of banks' book-keeping. Our goal is to propose clear banking policies to be implemented through bank double-entry bookkeeping. As business investment prompts economic growth, it is necessary to ask what financial problems eventually arise at the national level when investment is carried out, and what banking policies may be implemented to avert them. Monetary actors should

recognize a fundamental, logical difference between distributive payments and those transactions that, instead, are at the origin of new income. One of the main arguments of this work consists in the role potentially played by commercial banks whenever these policies are implemented. In this context, the central bank would keep its role of clearing national payments. In order for these policies to be feasible at the national level, the socio-institutional order must not be altered. Otherwise, the socio-political resistance to their application will be outstanding. We will argue that, if implemented, a reform of the system of national payments would prevent monetary disorders from triggering any divergence between global demand (households' purchasing power) and global supply (output).

I   The nature of money

In economics, '[o]ne of the contentious issues that still needs to be resolved is the existence of profits' (Rochon 2005: 136), a topic that, it is argued here, cannot do without an in-depth analysis of money. To understand how profit is monetized requires in fact a full knowledge of money creation and its deep relationship with output. In other words, the money-output identity allows for a clear study of income creation in the form of banks' deposits. The payment of wages and the formation of households' income is the first step towards the understanding of profit formation and monetary realization. Yet, confusion is still widespread about what money is: before starting out our investigation on profit, an assessment of money, credit, and bank activity is then required.

Almost all economists share the idea that money has physical attributes. Money, in fact, is usually thought of as a commodity. According to the epoch, it was identified with gold, silver, paper, and even stones and cigarettes. Yet, another conception of money must be considered. The development of banking techniques in fact paved the way to the idea of money being a numerical form of products. This is a burning issue, and must be carefully explained.

In this chapter we will first argue that, although classical economists shared almost exclusively a physical and quantitative conception of money, they also thought that money was functional to the circulation of products, a vehicle of goods circulation rather than a commodity to be exchanged with goods and services. According to classical authors – to Smith in particular – money was in fact a 'wheel' through which exchange is made possible, not the object of circulation. Following this line of inquiry, a

hint can be found in classical writings, according to which money, rather than being a commodity with its own value, is needed to measure the value of goods and services (e.g., see Gnos 2013, Cencini 2015, and Carrera and Rossi 2015). An assessment of the works of Adam Smith, Jean-Baptiste Say, David Ricardo, and Karl Marx will be made, aiming to shed new light in this regard.

It will also be shown that, at present days, a number of economists (see, for instance, Schmitt 1966, 1984; Cencini 1988, 2005; Deleplace and Nell 1996; Wray 1996; Smithin 2000; Gnos 2003, 2006; Graziani 2003; Rochon 2003; Rochon and Rossi 2003, 2013; Ponsot and Rossi 2009) has come to entirely reject the conception of money-as-a-commodity. They in fact believe that money is numerical in nature, not physical. We will see that, being money created by banks, monetary systems can do without whatever metal previously chosen to represent money. Money, thus, is nothing other than a number in banks' books. In line with Keynes's (1936) idea of product value being measured in wage-units, it will be argued that money is the account unit for wages. It is thanks to the numerical nature of money that a unit of account for the measure of product value (wages) can be found.

The analysis of the interaction between households, companies, and banks will be the starting point of our inquiry into profit. We will raise a question: is profit null at the macroeconomic level? Apparently, the equality between values and prices – known since classical times as the exchange law of equivalents – would lead one to conclude that national profit must necessarily be equal to zero. Yet, starting from the relationship between money and physical output, we will observe that another line of inquiry must be taken into consideration.

CLASSICAL PERSPECTIVES

First hints on money and value

In the *Wealth of Nations*, Smith deals extensively with the theme of money. As we shall see, Smith, though generally associating money with metals or banknotes, puts forward the idea that it possesses characteristics different to those of the goods for which it is the means of exchange. It is precisely to enable the exchange of goods that metals have been used by various countries during the course of history. Smith defines money as the 'universal instrument of commerce' by which goods are purchased, exchanged among them, and sold (Smith 1776 [1981]: 44).

Smith's analysis of money begins in historical terms. For example, he recalls how the Saxons' incomes, in ancient times, did not consist of money, but was 'in kind, that is, in victuals and provisions of all sorts'; it was William the Conqueror who introduced money into the country (1776 [1981]: 41). Iron was already commonly used by the inhabitants of Sparta to facilitate the commerce of goods. The Romans used copper, although, with the passing of time, gold and silver assumed the status of metals used officially to facilitate exchanges between the richest nations (see, for instance, Smith 1776 [1981]: 39). For example, Smith recounts that it was Servio Tullio who first coined money in Rome, using 'a Roman pound of good copper' (1776 [1981]: 42); on the other hand, at the time of Alexander the First, the Scots already used money identified as 'a pound of silver of the same weight and fineness with the English pound sterling' (1776 [1981]: 41).

There is, nevertheless, a different conception of money in the *Wealth of Nations*. Following Carrera and Rossi (2015: 49), in the *Wealth of Nations*, money, despite being conceived of as a physical good, has unique features. Money is 'altogether different from the goods which are circulated by means of it' (Smith, 1776 [1981]: 289). In particular, the concepts of money and income are two distinct concepts. In fact, Smith

argues that '[t]he revenue of the society consists altogether in those goods, and not in the wheel which circulates them' (1776 [1981]: 289). According to Smith, thus, there is a relationship between money and the product such that counting twice a hypothetical value of money and the value of the product is nothing but absurd.

> When, by any particular sum of money, we […] include in its signification some obscure reference to the goods which can be had in exchange for them, the wealth or revenue which it in this case denotes, is equal only to one of the two values which are thus intimated somewhat ambiguously by the same word (Smith, 1776 [1981]: 290).

According to Smith, money cannot be identified with income, thought of as the national product, since it is no part of it (Smith, 1776 [1981]: 291): money never constitutes a part of a country's real income, although it is needed so as to pay wages and purchase goods (Smith, 1776 [1981]: 295).

Also, Smith's words leave no room for doubt: wages paid to the inhabitants of any country are usually paid in money, yet real income does not consist of money. Smith writes that the wealth of the inhabitants of a given country varies according to the quantity of real goods they may acquire by means of that money. It follows that the income of inhabitants taken together, independently of their number, is formed from the value of consumption goods. Therefore, in calculating the income of society, neither money nor the global product should be counted, but only the latter's value (see Smith 1776 [1981]: 288-9). This explains the role Smith gives to money: it is a vehicle that permits the circulation of goods, or 'the great wheel of circulation', not to be included in the income of society (1776 [1981]: 289). Smith thus believes that money does not share the characteristics enjoyed by real goods. For this reason, it is unsurprising that the author views money as neither a material, nor a tool. 'Money is neither a material to work upon, nor a tool to work with' (1776 [1981]: 295).

Smith's analysis grows even more interesting when he refers to labor as the true resource with purchasing power: according to Smith, it is labor that grants individuals, as a whole, with the legitimate power to acquire the national product. He, in fact, defines labor as the primal form of money, preceding the use of metals to represent money. 'Labour was the first price, the original purchase-money that was paid for all things. It was not by gold or by silver, but by labour, that all the wealth of the world was originally purchased' (1776 [1981]: 48). Even in the absence of the use of money-metal, money already existed, in the guise of labor. The principal achievement of the introduction of metallic money was to permit movement away from a primitive economy, in which we imagine produced goods to have been exchanged in single transactions, not without difficulty, by two, or just a few, individuals. Money has thus assumed the role of a 'common instrument of commerce'. And, as Smith writes, it is in fact thanks to it that, for example, the butcher is able to exchange his own merchandise, such as beef or mutton, with products from the baker or brewer (1776 [1981]: 49). Therefore, according to Smith, in this context money becomes 'the exact measure of the real exchangeable value of all commodities' (Smith 1776 [1981]: 55). The value of commodities is 'more frequently estimated by the quantity of money, than by the quantity either of labour or of any other commodity which can be had in exchange for it' (Smith 1776 [1981]: 49). In this respect, Smith has no doubt: labor is the only standard of value, because its own value never varies. According to Smith, labor is the real price of things while 'money is their nominal price only', the value of money, in fact, depending on the 'variations in the value of gold and silver' (Smith 1776 [1981]: 51). Thus, it is for this reason that, despite attempting to recognize in money properties different to those of physical goods, Smith is unable to completely abandon the idea that a certain quantity of it is present in the economy. In the final analysis, Smith considers money to be a metal with special qualities, yet still a metal. Money is, in fact, defined as a commodity that may be bought and sold. '[M]oney is a commodity with regard to which every man is a merchant. Nobody buys it but in order to sell it again' (1776 [1981]: 554).

Yet, once again, another interpretation might be made of Smith's words. The last quote, in particular, is much interesting, for a particular conception of money emerges from it. Being "bought" and immediately "sold", money is not the object of payments, but a vehicle that allows the circulation of real products. Interpreted in such a way, Smith's words pave the way to a modern conception of money. From the one hand, by stating that money is the 'great wheel of circulation', Smith anticipated the modern idea that money is the vehicle through which goods circulate, not itself a commodity; on the other hand, we must recall that Smith identified labor as the sole factor of production. The two last observations lead us to think that, according to Smith, labor allows for the integration between vehicular money and the real product. Read from this point of view, it may be argued that Smith was among the first authors who advanced the idea of money allowing for the circulation of goods, being money just a vehicle void of any dimensional attribute.

Getting back to a more traditional analysis of Smith's economic thought, money, for him, is a special commodity that is used 'as instrument of commerce and as the measure of value' (1776 [1981]: 429). Nevertheless, money cannot be a unit of measure of global product value, since money itself is conceived of as a commodity. 'The quantity of money […] which can be annually employed in any country must be determined by the value of the consumable goods annually circulated within it' (1776 [1981]: 339-40). Had Smith identified characteristics of invariability in money, then economists would soon have accepted the idea that money was the measure of value. If money is associated with a particular merchandise, or 'quantified', it can no longer be a measure of value. Further: in Smith's analysis, value itself becomes the measure of money. Therefore, despite Smith's deep insights, money cannot be, in the Wealth of Nations, a vehicle that permits the circulation of goods, since it is identified as an instrument that is 'physically' substituted for products. '[T]he law which obliges the masters in several different trades to pay their workmen in money and not in goods is quite just and equitable. It imposes no real hardship upon the masters. It only obliges them to pay that

value in money, which they pretended to pay, but did not always really pay, in goods' (1776 [1981]: 158).

Unable to fully reject the idea of money-as-a-commodity, Smith did not identify a universal measure of products value. Although interesting, the study of money and value carried out by Say did not provide any better solution to the issue at hand.

'Whence had he that money?'

Say's message is already clear in the introduction to his Traité: money possesses a particular nature that should form the object of study in political economy. Money, in fact, is not an end, but rather a means, of productive activity (1821 [1971]: xviii). Thus, in favoring the productive process, money has an importance that can be truly understood only once the political economist has made an in-depth study of production. 'It is not […] until after the manner in which production takes place is thoroughly understood, that we can say how far the circulation of money and commodities has contributed towards it' (1821 [1971]: xli). During the productive context, following Say, money is necessary to pay workers' wages: those in charge of a productive activity 'must have stores of various kinds; seeds for his ground, provisions, fodder for his cattle, and food as well as money for his labourers' wages' (1821 [1971]: 107).

In Say's analysis, the function of money is to 'facilitate the interchange of products' and so, for this reason, it is compared to the 'oil that greases the wheels of complex machinery'. Thus money favors the movement of goods and is essential to productive activity. Say believes the function of money is to transport product values from the hands of certain people into the hands of others, from the hands of buyers to those of sellers, in a continual flow. By means of money, individuals can acquire products that are transformed momentarily into money. 'So that you will have bought, and every body must buy, the objects of want or desire, each with the value of his respective products transformed into money for the moment only' (1821 [1971]: 133). In Say's

view, this temporary existence of money implies its simple passage from hand to hand. 'Yet it is not the sum of money that is destroyed: that has only passed from one hand to another' (1821 [1971]: 413). It is money's link with the product that is temporary.

In a similar context, the national product has a value that is guided by money so as to permit the exchange of one good with another. '[A]lmost all produce is in the first instance exchanged for money, before it is ultimately converted into other produce' (1821 [1971]: 133-134). An interesting aspect of this question is that money would not exist had human labor not created a product with its own value. This idea is easy to identify in an example given by Say, in which he explains that the passage of money between one purchase and another must originate with the value produced by the activity of some individual.

> A priest goes to a shop to buy a gown or a surplice; he takes the value, that is to make the purchase, in the form of money. Whence had he that money? From some tax-gatherer who has taken it from a tax-payer. But whence did this latter derive it? From the value he has himself produced (1821 [1971]: 136).

Yet perhaps Say does not sufficiently explain how such value originates. In fact, despite an interesting attempt to understand the characteristics that distinguish money from real products, Say's conception of money has not broken all links with the idea that it is a commodity. '[M]oney, like other things, is itself a commodity' (1821 [1971]: 149). In its guise of a commodity, money is thus an object of commerce for individuals: '[m]oney itself must have been originally purchased with some other product' (1821 [1971]: 146). It is therefore natural that, in the ambit of this money-value concept, money came into being thanks to the use of metals and constitutes real national capital. 'The […] utility of the precious metals is, to act as the material of money, that is to say, of that portion of the national capital, which is employed in facilitating the interchange of existing values between one individual and another' (1821 [1971]: 151). Being

conceived of as a substance, money may therefore be parted from those individuals who wish to exchange goods, just as if money itself were a real goods item.

In the final analysis, Say's conception of money, like Smith's, was dualistic. From the one hand, Say was unable to reject the idea that money is a commodity. The result is that the author viewed money as a substance with its own intrinsic value, additional to that of the product derived from industry. '[M]oney is […] a commodity bearing a peculiar and intrinsic value' (1821 [1971]: 224). On the other hand, it can be easily argued that money, according to Say, is a vehicle through which goods circulate from hand to hand. Being used as a temporary vehicle, money is strictly linked to production and consumption: it is thanks to money indeed that a product is purchased and sold, passing from one agent's hands to the other's. It is thanks to working activity that one is paid in money. It is thanks to money's expenditure that one purchases the product. Money, hence, cannot ever be the object of payments, for it conveys goods and services from hand to hand. Say had the merit to pay much attention to the vehicular character of money – in line, to a certain extent, with Smith's inquiry. However, he could not find a proper explanation of how money is created.

We shall see that a study of money and value was carried out also by Ricardo.

An intense debate

According to the common interpretation of Ricardo's words, he conceived money as metallic: in his view, gold is, indeed, the commodity to be considered as money, since gold, as well as silver, 'like all other commodities', has a value 'in proportion to the quantity of labour necessary to produce them, and bring them to the market' (1817 [2004]: 352). Furthermore: not only is money identified with gold, but gold is also the unit of measure for value. In fact, following Lord Liverpool, Ricardo writes: 'I consider Gold as the standard measure of value' (Ricardo 1809 [2004]: 30, III). Once again, he writes: '[g]old and silver, like other commodities, have an intrinsic value, which is not

arbitrary, but is dependent on their scarcity, the quantity of labour bestowed in procuring them, and the value of the capital employed in the mines which produce them' (Ricardo 1810-11 [2004]: 52, III).

It is inevitable that, following Ricardo, '[t]he quantity of money that can be employed in a country must depend on its value' (1817 [2004]: 352). Thus, having conceived money as a good, the author considers money to have its own value, just as with all products. This is independent of the type of material used as money in everyday life. In fact, Ricardo also studied paper money, the use of which was beginning to be established, along with the expansion of industry and trade. Ricardo believed that the value of paper money derives from the adjustment of its quantity 'to the value of the metal which is declared to be the standard', without requiring 'that paper money should be payable in specie' (1817 [2004]: 354).

One should not be surprised at Ricardo's association of money with metals, and Ricardo was not the only economist who associated money creation with minting. However, a careful observation of modern economies inevitably leads to the rejection of such a materialistic conception of money, bank money being the rule. In modern capitalist systems, money creation cannot depend on the lesser or greater availability, at different times, of one or another metal, but on its strict relationship with the produce of labor. It seems that Ricardo was aware of this. Ricardo, following Hume, tried to explain the relationship between money and production. He wrote that the '[v]alue of the circulating medium of every country bears some proportion to the value of the commodities which it circulates' (Ricardo 1810-11 [2004]: 90, III). He continues: '[i]n some countries this proportion is much greater than in others, and varies, on some occasions, in the same country. It depends upon the rapidity of circulation, upon the degree of confidence and credit existing between traders, and above all, on the judicious operations of banking' (Ricardo 1810-11 [2004]: 90, III).

The physical concept of money did not help Ricardo find an answer to his professional quest; namely, the search for a universal measure of the value of commodities:

[t]he only qualities necessary to make a measure of value a perfect one are, that it should itself have value, and that that value should be itself invariable, in the same manner as in a perfect measure of length the measure should have length and that length should be neither liable to be increased or diminished; or in a measure of weight that it should have weight and that such weight should be constant. Altho' it is thus easy to say what a perfect measure of value should be it is not equally easy to find any one commodity that has the qualities required (Ricardo 1823 [2004]: 361, IV).

Finding a measure of value that was invariable over time proved to be an impossible task. Moreover, Ricardo was not the only author who was seeking a measure of value: 'Mr. Malthus has recommended the pay of a day's labour whatever it may happen to be as a perfect measure of value – labour has value, and so far no objection can be made to it, but is its value invariable?' (ibid.: 361-362, IV). Ricardo's criticism of Thomas R. Malthus' theory of value (the theory of 'commanded labour') continued until his death. As stated in Porta (1992), on April 24, 1823, the publishing house of John Murray published Malthus' The Measure of Value Stated and Illustrated With an Application of It to the Alterations in the Value of the English Currency Since 1790. On April 29, Ricardo wrote a letter to Malthus in which he expressed his views on the measure of value identified by the latter. (Porta's writings (1992) are important since they are a companion volume to the works and correspondence of David Ricardo, edited by Sraffa with the collaboration of Dobb (1951-1973). As Porta recalls (1992: x), the collection edited by Sraffa did not in fact contain Ricardo's Notes on Malthus's 'Measure of Value', which were rediscovered in 1943, together with the 'Mill-Ricardo Papers' and were published in the *Rivista Internazionale di Scienze Economiche* and the *Commercial-International Review of Economics and Business* in 1979. From the content of these papers, it emerges that Ricardo believed in an absolute product value. See Porta 1992: x).

Ricardo disagreed with Malthus over the idea that the value of a merchandise was to be identified with the quantity of work it commanded. Ricardo held the contrary belief that product value was to be identified with the labor embodied in it (see Ricardo 1817 [2004]; Malthus 1820 [1989]). Ricardo believed the choice of the quantity of work commanded was arbitrary and therefore not universally recognized. The measure of value, for Ricardo, must be invariable in nature, although, failing to find it, he grew convinced of the 'impossibility of attaining a perfect measure' of value (Porta 1992: xiv). In fact, Ricardo always defended his own ideas with an open mind, albeit highly critical, with regard to those of his opponents. More specifically, as noted by Deane (1978: 68), this open-mindedness was due to the fact that 'Ricardo never solved to his own satisfaction the problems associated with devising a measure of value'. Interestingly, Ricardo wrote a letter to James Mill criticizing his son John Stuart (see Sraffa and Dobb 1951-1973 [2004], IX: 387; Deane 1978: 68), in which he expressed his conviction 'that strictly speaking there is not in nature any correct measure of value nor can any ingenuity suggest one'. The controversy between Ricardo and Malthus was left unresolved.

Yet, it is interesting to observe that another interpretation of Ricardo's thought can be proposed. It can be argued indeed that, despite Ricardo had likely been an ante litteram author of the quantitative theory of money, such a labelling might be partly mistaken. In fact, in the Plan for the Establishment of a National Bank (1824), Ricardo made a thorough study of money and credit in which, in particular, he focused on money creation. The Plan is significantly interesting, for Ricardo distinguished between the monetary intermediation and the financial intermediation of banks. According to the author, banks should not grant credits (the financial intermediation) to the public by emitting nominal money (the monetary intermediation). In other words, bank lending activity should be regulated in order to impede that the amount of credits be greater than the deposits. Therefore, Ricardo's conception of money was not as univocal as it usually appears. Ricardo was arguing that the amount of bank credits must be strictly financed by the money coming from the public (deposits); this means that, if the credit level were

to be greater than the deposits level, inflation would set in. Indeed, in this case excess money would just be nominal, i.e. uncoupled from any production activity. It can be argued, then, that, according to Ricardo, nominal money was emitted by banks provided that it was backed by goods and services. This means that money was conceived by Ricardo as something different from real product. By asserting that bank money is nominal, Ricardo was implicitly stating that money has no intrinsic value, and, above all, that it is dimensionless. Controversial enough, this interpretation of Ricardo's Plan would deserve much more attention than usually paid to by the international academia.

Marx was the author who probably got closer to the concept of money-as-a-number. Yet, he did not abandoned the idea of value-as-a-substance.

Money: a relationship?

Marx can be defined as a classical author sui generis, inasmuch as he refused to accept the order of things, as did, instead, other authors defined (by Marx himself!) as Classicals (see for instance Pasinetti 1981: 12). Given this, it is enough to add, instead, a comment on his view of money as a form of value.

Marx's concept of money was original in comparison to what other authors meant, by money. Marx was in fact convinced that money was a value-form of goods. If it is, indeed, true that the global product possesses its own value, then money is its representative form. However, this value should not be confused with that of use, by which is meant the simple value each individual attributes to the product according to the utility to be derived from its use. Thus, according to Marx, an absolute value exists for the product, independently of the use individuals may make of it. 'Every one knows, if nothing else, that commodities have a common value-form which contrasts in the most striking manner with the motley natural forms of their use-values. I refer to the money-form' (1867 [1982]: 139, I). The money-form would permit the homogenization of products that, inasmuch as they are physical, are themselves heterogeneous. Marx

(1867 [1982]: 151, I) also explains that the use of money as value-form was already discernable in Aristotle, who had explained how the inequality between different physical goods (five beds and a house, for example) was 'indistinguishable' from the inequality between one of these goods and a certain amount of money (for example, '5 beds = so much money'). Without an identity covering product and money, physical goods would not be homogenized with each other: more specifically, they would not be reduced to a measurable magnitude. Nevertheless, the use of gold gives rise to a 'general equivalent', a means chosen from among many to permit the exchange of goods. 'Gold confronts the other commodities as money only because it previously confronted them as a commodity. Like all other commodities it also functioned as an equivalent, either as a single equivalent in isolated exchanges or as a particular equivalent alongside other commodity-equivalents' (1867 [1982]: 162-163, I). Thus, in Marx's theory, money-form is reflected in a single goods item and in relationship to all other goods. Following Marx's line of reasoning, money becomes a commodity endowed with its own value, just as with all other goods. Therefore money is analyzed as money-substance, the value of which is determined, as for the value of all commodities, by the labor-time required to produce it.

> Money, like every other commodity, cannot express the magnitude of its value except relatively in other commodities. This value is determined by the labour-time required for its production, and is expressed by the quantity of any other commodity in which the same amount of labour-time is congealed (Marx 1867 [1982]: 186, I).

Marx's attention thereby shifts to the concept of money-commodity: gold is chosen by Marx as merchandise-money. As he writes (1867 [1982]: 188, I), the function of gold as money is that of supplying physical material to goods that represents an expression of their value: in Marx, therefore, the quantity of gold is thus an expression, a common 'denominator', of the value of the product. In its role as a common denomina-

tor of goods, gold is the general equivalent that thereby becomes money (ibid.). Products are thus measurable, although this is not thanks to money, but, on the contrary, it is money itself that becomes measurable thanks to the product. In Marx's view, human labor is the measure of product value and it is therefore thanks to it that products become measurable; '[m]oney as a measure of value is the necessary form of appearance of the measure of value which is immanent in commodities, namely labour-time' (1867 [1982]: 188, I).

Relative to value, Marx identifies labor as the measure of value: '[l]abour is […] the immanent measure of value, but it has no value itself' (1867 [1982]: 677, I). Marx believes labor has no value, in line with the idea that labor is not a commodity. Yet, Marx cannot entirely dispose of a physical conception of value. Resorting to the concept of labor-force, which is to say, a commodity distinct from labor, sold by workers to capitalists, labor-force is a substance because the temporal dimension is implicit in it: in any given society, the production of use values takes place thanks to a certain 'labour-time'. In Marx's view, '[w]hat exclusively determines the magnitude of the value of any article is therefore the amount of labour socially necessary, or the labour-time socially necessary for its production' (Marx 1867 [1982]: 129, I).

Thus Marx believes money is a necessary form to express the value of the global product, measured in labor-time. The measure of value is therefore the work time required to produce the product and money becomes the form in which its value is expressed. Marx realizes that, inasmuch as it is a form of the value, money itself cannot have a price: 'money has no price […]. In its function as measure of value, money therefore serves only in an imaginary or ideal capacity' (1867 [1982]: 189-190, I). It should therefore be noted that Marx arrives at the conception of money as a simple numerical form without value, an abstract entity. However, he is unable to detach, completely, this concept of money as the form of value from the widespread concept of money-merchandise. In fact, he states that metal money has a price that depends exclusively upon 'substance that is money' (1867 [1982]: 190, I).

Thus, two concepts of money emerge from Marx's theory (1867 [1982]: 192, I). Money is a numerical form, a measure of value inasmuch as it is human labor objectified, socially incarnated. However, it is also a price standard inasmuch as it is a specific quantity of a specific metal of a specific weight. In its role as money-form, money functions as 'money of account' in fixing product value (1867 [1982]: 195, I).

An unresolved issue

Classical authors, particularly Smith, had suspected that money was the unit of account and the means of products circulation. However, they did not entirely reject the conception of money-as-a-commodity. They could not reject, thereby, the idea that money possesses its own value. It was only in the second half of the XXth century that a radically new conception of money came to the fore, according to which money has no intrinsic value. Also, being created thanks to banks' intermediation and associated to goods and services via the payment of wages, money would be functional to income formation. 'Modern credit money, income and the real economy are linked through the process of production. […] In the first instance, discussion must emphasise the creation of money' (Rochon 2003: 116). This will be the object of study in the next section.

BANK MONEY

It has been shown (Gnos 2013: 31) that some of the concepts advanced by the theorists of the monetary circuit can be found in a number of classical writings and Keynes's (1930a,b [1979]) ideas on money. Among the authors referring to these ideas, there is common agreement on what money is not: that is to say, it is not a commodity (see for instance Schmitt 1975, and Graziani 2003). As Rossi (2007: 18) points out, '[m]oney does not need to be reified into a precious metal in order for it to be a means of payment: it would be enough […] a double-entry book by means of which […] economic transactions are recorded and settled with a mere book-entry device'.

The question at issue regards the nature of money, to wit, what money is. The underlying theme of the circuit theory is that money is of a numerical nature, with no intrinsic value: 'a money-unit is by definition number 1, "made concrete" in a bank's balance sheet' (Schmitt 1998: 38, our translation), or, again, money is 'a pure symbol, a stroke of the pen in the bank's balance sheet' (Realfonzo 1998: 43). It is thanks to double-entry bookkeeping that an analysis of money can be made. As Rochon and Rossi (2013: 218) point out, based on Cencini (2005: 299), such accounting tool was 'developed […] – in the thirteen century – by Italian traders, who took advantage both of Arabic numerals and of the Indian conception of zero', and its usage gave rise to banking activities.

The monetary theory of production examined here is built around three categories of agents: firms, banks, and workers, or wage-earners. Both Graziani and Schmitt emphasize the role of banks and firms in the functioning of capitalist economies. Where they concur is on the idea of a mutual relationship between firms and banks, present in Keynes already (Graziani 2003: 68): according to Graziani, 'if a firm has decided upon a given volume of production, there will also be a bank prepared to grant the required finance'. According to Schmitt (1998: 16, our translation), 'by working "hand in hand", the firm and the bank substitute a creation of money for the real production of workers.

It is a matter of substitution and not of two simultaneous productions, as if money creation were to be added to the production of goods'.

Monetary creation consists in the monetization of the real product represented by financial securities in the asset side of bank's balance-sheets (Cencini 2015: 21). The monetization of production rests on this basic idea. A firm requests a bank to credit workers' deposits with wages, relying on a line of credit that the firm has previously obtained and backed by securities (Rossi 2007: 25). At the instant wages are paid out, the bank payment creates money (Rochon and Rossi 2013: 214). Money-as-stock designates bank deposits, while income is the result of such a payment (Cencini 2001: 66), where production is the real content of money, and money the form of real output. 'At the instant of receiving 100 francs as payment for his productive activity, agent B acquires his product, not in nature, but in money' (Schmitt 1998: 16, our translation).

The conception of money presented here originates from the study of double-entry bookkeeping. Accordingly, two kinds of "money" seem to be at the heart of the economy, namely, money-as-a-flow and money-as-a-stock. "'[M]oney-as-flow" does exist only in payments, at the instants when they take place; […] the other money, money-as-stock, is the definition of deposits constituted within banks' (Schmitt 1998: 7, our translation). Money (-flow) is a means of payment inasmuch as it is a numerical vehicle for the product; money (-stock), the bank deposit, defines a stock of real goods that are the object of payment. Money defines a monetary circuit as an instantaneous flow that occurs when the bank, B, registers a transaction in which agent A – debited and credited – buys from agent C – credited and debited. C's credit is guaranteed by the fact he receives a security corresponding to a bank deposit. Viewed from this perspective, money is both a flow (instantaneous) and a stock.

The payment of wages is no exception: in the moment in which wages are paid to workers, money defines both an instantaneous flow and the constitution of bank deposits. Workers, *W*, are credited, while the company, *F*, is debited. The constitution of workers' bank accounts guarantees a (credit) security whose real object is the product (goods and services) deriving from work activity and deposited in company warehouses.

An example might be of help. Let us suppose workers' bank accounts are credited with wages amounting to 100 money-units (m.u.). As soon as the payment of wages is made thanks to a credit line granted by the bank to the company, the stylized bank's balance sheet will be affected as follows (Table 1.1).

TABLE 1.1 *The stylized balance sheet of commercial banks*

Banks B			
Assets			*Liabilities*
Loans	Δ 100 m.u.	Deposits	Δ 100 m.u.
Securities	… m.u.	Borrowings	… m.u.
Reserves with the central bank, cash, other assets	… m.u.	Other liabilities	… m.u.

Source: *author's elaboration from Federal Reserve System (2016a).*

Given that the bank grants credit to the industrial system (i.e. to company *F*), and that it simultaneously registers workers' deposits for the same amount, we can further simplify the previous balance sheet as shown in Table 1.2 (let us suppose all entries but loans and deposits are nil).

TABLE 1.2 *The payment of wages: bookkeeping*

Banks B			
Assets			*Liabilities*
F	100 m.u.	W	100 m.u.

Source: *author's elaboration from Cencini and Rossi (2015).*

Now, monetary circuit theory generally assumes there is no cash circulating in the economic system. Such an assumption might seem an obstacle to understanding the reality of the situation. However, a simple explanation should serve to show this is not the case. In point of fact, there is no need to modify the analysis undertaken so far, even if we presume the economy includes banknotes and coins, as well as available monetary funds deposited in households' current accounts. Indeed, as we shall shortly see, global demand (expressed as total deposits) would remain unvaried with respect to an economy in which only scriptural bank money were recorded in households' deposits. Even in our economies, where money is often identified with notes and coins, 'we can assert that *all* money – including metallic money – is credit money' (Realfonzo 1998: 36). For the sake of explanation, let us observe a stylized balance sheet of central banks (Table 1.3). Central banks' assets include securities and lending to depository institutions. The liabilities side is made of bank notes and coins in circulation, commercial banks reserves, central bank reserves, and capital.

TABLE 1.3 *The stylized balance sheet of central banks*

Central Bank			
Assets			*Liabilities*
Securities held outright	…	Banknotes in circulation	…
Lending to depository institutions	…	Depository institutions reserves	…
		Capital and central bank reserves	…

Source: *author's elaboration from Federal Reserve System (2016b: 4).*

Now, let us suppose a salary of 100 monetary units to have been credited to workers' current accounts. As previously seen, banks enter this workers' credit on the liability

side of their balance sheets; at the same time, banks enter a corresponding debit of the same amount for the companies involved. Let us now imagine the situation in which workers withdraw a fraction of their deposits amounting to x monetary units. In this case, the workers' gross income in the banking system remains unchanged. The commercial banking system registers a reduction of x monetary units in checkable deposits on the liability side of their own balance sheets and an equal reduction in reserves with the central bank. Meanwhile, on the liability side of its balance sheet, the central bank registers an increase in debit with regard to banknotes' holders (an increase in notes and coins in circulation) and a reduction in reserves with the commercial banking system. Hence, it can be seen that there is no change in macroeconomic demand: income levels generated thanks to the monetization of production remain unaltered, independently of any consumer decision to maintain higher or lower levels of cash. Otherwise said, the monetary base level is not affected by variations in currency in circulation, because the increase in banknotes is matched by an equal decrease of commercial banks' reserves with the central bank.

Let us now go back to the relationship between money and real goods (national output). The vehicular and dimensionless nature of bank money leads to an understanding of how money, exchanged for the product, is not a commodity to be added to the product itself: an exchange in fact takes place between money on the one hand, and the domestic product on the other. This conception of the relationship between money and output paves the way to a new research into the exchange law of equivalents. Let us make some observations in this regard.

THE EXCHANGE LAW OF EQUIVALENTS

At a stage of the economy we might define as "original", the entire product is made up of wage-goods corresponding to monetary and real production costs (deposits in the balance sheet of commercial banks, which are matched by loans to the industrial system for the same amount). Company costs sustained in the employment market (wages) must of necessity correspond to employees outgoings in the product market. If, for example, company F pays wages to workers W to a total amount x, these workers can spend x monetary units to acquire the global product (Figure 1.1). Inevitably, company earnings must be equal to outgoings, which is to say, production costs (wages).

FIGURE 1.1 *Profit: an issue (I)*

$$F \quad x \quad W \quad x \quad F$$
$$\longrightarrow \qquad \longrightarrow$$
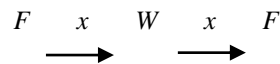
Source: *author's elaboration based on Cencini and Schmitt 1977: 142.*

How is possible, then, for profit to form? If we were to define profit as the difference between earnings and company costs (wages), there would be an immediate observation to be made. Profit, understood thus, is necessarily null. It is logical to reject a definition of profit as the difference between sales proceeds and wages, since such difference is null. Another inquiry must also be taken into consideration when attempting at explaining profit formation. Let us suppose the global product derived from work is subdivided into wage goods and profit goods. In this conception, wages are the monetary income distributed to the group of workers for the total amount of product they sell to the company (Marx, for instance, called this particular product "labor power"). Profit is conceived as an excess product or overproduction in terms of what is required by (waged) workers for consumption. The payment of wages undertaken by a company allows workers to acquire wage goods, but not profit goods. The nature of surplus value,

or profit, is in this case exclusively real, since it cannot be realized in monetary terms. Profit is thereby real in nature, being an excess product with respect to the production of wage goods. It therefore follows that, according to this view, profit is a real asset whose amount is to be added to wage goods. Profit, however, is never realized in money. The following could be an example diagram (Figure 1.2).

FIGURE 1.2 *Profit: an issue (II)*

$$v+pl \text{ (formation)} \qquad\qquad pl \text{ (realization)} = 0$$

$$F \quad v \quad W \quad v \quad F$$

$$\longrightarrow \qquad \longrightarrow$$
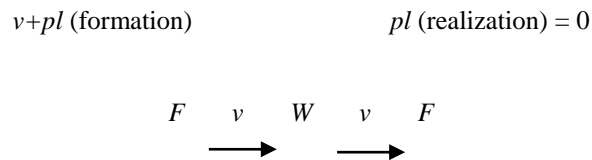
where *v* is variable capital, i.e. money spent on labor power, and *pl* stands for surplus-value or profit.

Source: author's elaboration based on *Cencini and Schmitt 1977: 143.*

In the two previous cases, monetary profit is always null. Throughout this work, we will seek to develop a theory where profit's nature is twofold: namely, both real and monetary. The issue at hand is strictly related to the equality between values (wages) and prices.

Since the times of classical authors, the value of produced goods has often been measured in the working- (or labor-) time necessary to produce them. Further, economists have shared the belief that output values and prices cannot diverge from each other. In fact, the (classical) exchange law of equivalents states that goods must be exchanged in full compliance with the equality between (exchanged) values: namely, if the production time of a product is one week, it will be exchanged for those goods requiring men to work over an entire week to produce them, and vice versa. This means that, according to classical authors, goods value, which is measured in labor-time, is determined within production, not through exchange. Money enters this specific reasoning as soon as it is thought of as a general equivalent for all produced goods. Once

money is conceived of as a commodity, the exchange law of equivalents is also applied to the supposed exchange between money and products. Money and products being measured in labor-time, it comes that values and prices must necessarily be equal: once one good is exchanged for another one, there must be equality between their values and their money prices, for the exchange to take place in full respect of the classical tenet. For instance, if producing one money unit requires x working hours, a good valued at nx working hours will also have a money price of nx money units; according to the exchange law of equivalents, it will be then exchanged for those goods (including, for instance, money) valued (and priced) at nx working hours (money units). According to classical authors, hence, prices always align with (i.e. are equal to) the values of produced goods, this happening prior to exchange. Thus, the numerical ratios between values and between prices are strictly equal one to the other; this meaning that, if one good is valued as two items of another good, the price of the former will be twice the price of the latter.

Classical authors faced thus an important problem. Assuming that prices are identical to values, how is it possible for (real and monetary) profit to form? Economists have often argued that labor should be treated as a commodity, the price of which corresponds to wages. If this were the case, a problem would appear, however. As Cencini (2015: 119) observes, if the time socially necessary to produce a table were 8 hours, 8-hours-labour wages would be the price of the labor sold by workers: the exchange of equivalents (labor and the table) would impede profit from forming. Marx was not caught in this snare. It was Marx who made an important effort to deal with this problem, although – it must be observed – without success. Marx suggested a peculiar solution to explain profit formation, without rejecting the strict equality between values and prices. He argued in fact that workers sell a particular commodity that he called labor-power. According to Marx, the overall value of produced goods is higher than the value of labor-power: in fact, workers are paid what is needed for reproducing labor-power, and, once labor-power has been reproduced, workers produce goods that are gratuitously ceded to the company. Unfortunately, Marx's hypothesis is not convincing,

for, given Marx's hypotheses, surplus value cannot be realized in money, i.e. profit cannot be monetized (see our Appendix on this). In fact, only a share of produced goods can be sold to workers by the company (see Figure 1.2): being wages the only existing income in the economy, the remaining share of produced goods will remain physically owned by the company and will never be sold, for no money is left in workers' hands for consumption.

The equality between prices and values can also be found in neoclassical writings. In this theoretical framework, production is no longer the sphere where value originates: it is in fact through the exchange phase that values and prices are determined. Since Walras, neoclassical economists have always thought that the monetary prices of goods reflect a numerical ratio at which products are exchanged one for the other. Namely, 'the value of one table will be equal to the value of two chairs, if the exchange ratio between tables and chairs is 1 table for 2 chairs, i.e. if the relative price of the table is 2 chairs' (Cencini 2015: 118, our translation). Hence, neoclassical authors distanced themselves from classical economists for they thought that value is determined within the exchange (or circulation) phase, and not during production. Nevertheless, the equality of values and prices holds true in both theories: in the neoclassical framework, the value of produced goods is determined through exchange and coincides with relative prices. Yet, as Cencini (2015: 120) recalls, a certain degree of (temporary) divergence between prices and values has been hypothesized by neoclassical authors. In fact, neoclassical theory assumes that, being profit nothing but the interest paid to capital, interest would be the measure of the increase in value generated by the use of capital. Given such an increase in value, monetary prices would then increase and align with values. This reasoning is unfortunately made without an iota of proof. In modern economies of production, it will be argued in this work, wage-income is the sole macroeconomic income, and it origins from labor alone. This amounts to saying that it is thanks to labor that economic value is formed. Fixed capital never gives rise to a new income in the same way as labor does. The neoclassical attempt to explain profit formation and the equality between values and prices is hence cast into doubt.

In the twentieth century, Keynes made an important effort to explain profit for-
mation while respecting the equality between prices and values (see, above all, Keynes
1930a [1971]). Being labor the sole factor of production, according to Keynes (1936
[1964]) total output value must necessarily be measured in wage-units. One should then
hypothesize profit (and other non-wages incomes) but to be a substitution income, i.e.
an income that derives from wages. Keynes's attention, however, was paid to other, yet
important, issues. We will argue that profit formation, both monetary and real, can be
explained once equal attention is paid to both production *and* exchange. Profit for-
mation (monetary and real) must be explained in full compliance with the equality
between prices and values, and the identity between national (wage-) income and
national output (demand and supply). A theory will be proposed where production and
consumption are studied within production and exchange. 'How can it be […] that
prices and values do coincide and that, nevertheless, positive profits do form?' (Cencini
2015: 118, our translation). We will argue that the formation of real profit and its
monetary realization are a fusion of the productive process and the exchange of pro-
duced goods and services. It will be argued that monetary profit is not complementary
(additive) to monetary wages. From this viewpoint, real wealth (wage goods) produced
through the productive process is not increased by real corporate incomes (profit
goods), since they are a company gain deriving from the distribution of the total amount
of global wages. Workers are credited with monetary wages, which are the nominal
measure of the whole produced output. Then, a share of the product is appropriated by
companies in the form of profit. A full understanding of the classical concept of price or
absolute value leads to a solution of the problem of the real formation and monetary
realization of profit, which, let us write it once again, is both nominal and real. One
condition must be satisfied: the creation of economic goods, whose value amounts to
salaries, must conciliate with the possibility for companies (the 'capitalists') to make a
profit without altering the total macroeconomic value of the produced output. Profit, it
will be argued, 'represents the gratuitous appropriation of a fraction of the product of
work as a result of an exchange between non-equivalents. In these circumstances profit

does not represent an increase in real wealth. Rather, the excess of price over value does not influence at all wealth formation. It represents nothing but a change in the allocation of wealth, as profits bite into wages' (Cencini and Schmitt 1977: 64, our translation). 'Income is not an *a posteriori* construct resulting from these material conjuncts. […] Being modern requires a shift from complementarity to inclusion' (Schmitt 1966: 266, our translation).

II The analysis of profit since 1874

The origins of modern political economy date back to the economic theories of the Physiocrats or *économistes* and the English school, Adam Smith being its first exponent. Prior to modern economic theories, as Deane puts it (1978: 1-2), the epochs of economic thought can be associated with Classical Greek authors, medieval scholastics, and the mercantilists. No systematic attempt to study profit was made before the advent of the English school. The transition from the pre-theoretical to the theoretical level took place thanks to classical authors, according to whom land was a prime "factor of production", but where increasing attention was paid to wages, profit, and capital. The Industrial Revolution was of course the phenomenon that drew the attention of economists to the study of profits and capital accumulation (see Pasinetti 1981, 1986).

The focus of economists was previously almost univocally on land as a key factor in the creation of surplus or net worth, and the concept of profit was relegated only to fragmentary ideas. During the Middle Ages in Europe, especially, the concept of profit was strictly linked to the concept of a just price, or *justum pretium*. The concept of the just price goes back to the medieval scholastics and the mercantilists. With regard to this, two streams of thought are worth mentioning: the just price was indeed equated to the fair price that allows the buyer to maintain his/her status, or the market price. On the one hand, the just price is commonly identified by Scholastic authors with the price at which goods *ought* to be sold on the market. On the other hand, however, De Roover (1958) concluded that the scholastics equated the *justum pretium* 'to the competitive market price' (Deane 1978: 3), and not to the price at which goods *ought* to be sold. This article is well-known in economic literature. For instance see Deane (1978) and

Pasinetti (1986: 409), who quotes other authors relative to the issue of the just price, such as Hagenauer 1931 and Baldwin 1959. See also Schumpeter 1994 [1954]. The concept of 'market price', a propos of which some scholastics and mercantilists had already written, has emerged as a fundamental issue of modern economic analysis, whereas the concept of 'fair price' has been discarded. Scholastic and mercantilist analyses were kept to the level of a pre-theoretical stage (see Pasinetti 1986, and Schmitt 1986), without being elevated to the level of economic theory. Whatever the conception of one author or another with regard to prices, no 'systematic economic inquiry and explanation, or a coherent set of generally-accepted principles of economic theory' (Deane 1978: 4) was developed either in the early stages of the Middle Ages nor by the later mercantilists.

In the XVIIIth century, authors started to develop the concept of economic value. As noted by Pasinetti (1986: 414), '[t]he approach to discussions on value changed dramatically towards the end of the eighteenth century. From the ethical pronouncements on value, writers began to move on to *theories* of value'. It was in the XVIIIth century that the Physiocrats and Adam Smith began to apply, in a systematic manner, the 'theories of the natural order underlying the real world' to economic phenomena (Deane 1978: 5). Their studies differentiated from those previous in such a way that, in the XIXth century, theorists 'narrowed themselves down to a choice between two quite different and alternative routes. Namely, the "objective" route of a cost-of-production and, more particularly, of a labour theory of value' (Pasinetti 1986: 414), which are to be identified with the Classical school, 'and the "subjective" route of a "marginal utility" theory of value', or 'pure exchange economy' (Pasinetti 1986: 414), namely the theory that became to be known as 'neoclassical'.

Two economic schools of thought can be dated back to the XVIIIth century: the Physiocrats school and the classical school, which were both searching for normative economic laws.

French economists, best-known as *Physiocrats*, were studying public policy 'with respect to trade and taxation; and to this end they fashioned the concept of an "econom-

ic order"' (Dobb 1973: 39-40). Following Dobb (1973: 40), the French school was looking for the 'physiology of economic society – with procedures and rules of its own to which governmental policy must be adapted if not subordinated', as opposed to the English tradition, which saw "human nature" and "motivation" as economic players. Dobb's (1973: 40) quote of a sentence from Quesnay's *Philisophie Rurale* (quoted in Meek 1962: 69) makes clear that Physiocrats aimed to search for an "economic order": '[i]f the moralists and philosophers do not base their sciences on the economic order, on agriculture, their speculations will be useless and illusory. They will be doctors who perceive only symptoms and ignore the disease. Those who depict for us the morals of the age without going back to causes are only speculators and not philosophers'. For the Physiocrats, the effect of labor on the economic system was that of reproducing consumed goods. The sole net product was that deriving from Nature and it was considered a surplus, a profit for landowners: the estate owners, aristocrats, consumed the product received from the other classes as income. In fact, Physiocratic theory identifies two other classes, besides that of the landowners: that is, agricultural workers, the sole productive class, and artisans, who produce manufactured goods from raw materials. These two classes existed at subsistence level: their output continually reproduced, over time, a product aimed at maintaining "productive consumption" in time. Quesnay (1758) gives this depiction of the economy in his famous *Tableau économique*. Following a traditional reading of the *Tableau*, Nature, through agricultural activity, supplies the necessary net product to enable the initial situation to be restored.

An initial attempt to ascribe to human labor the ability to generate net value is to be found in the classical authors. See, for instance, Adam Smith (1777 [1981]) and David Ricardo (1809 [2004], 1816 [2004], 1817 [2004], 1823 [2004], 1824 [2004]), together with Jean-Baptiste Say (1803) and Karl Marx (1867 [1982], 1898 [1969], 1925). The first Chair in Economics may be traced to 1751, albeit Economics was, at the time, considered to lie within the field of studies of moral sciences. In fact, this was the year in which Adam Smith was given a post in teaching Logic at the University of Glasgow. On this, see for example *The Scots Magazine*, Tuesday 15th, January 1751

(British Newspaper Archive, 2015). As stated in the *Caledonian Mercury* on Tuesday 28th, April 1752, Smith was then appointed Professor of Moral Philosophy at the same University, 'in the Room of Mr. Thomas Craigie deceaft' (British Newspaper Archive, 2015). The *English school* of the eighteenth and nineteenth centuries searched for normative economic laws. In Smith's writings, we indeed find an attempt to build an economic theory that is 'within the ambit of moral philosophy as a normative study of society' (Deane 1978: 13), where economic norms are related to a 'moral [...], a philosophical rather than a logical or mathematical discipline' (Deane 1978: 13). Smith was the first English author who managed to move 'away from the empirical-quantitative bias of the political arithmeticians' (Deane 1978: 13). According to Dobb (1973: 41), the English school believed that individual interests and competition would allow for a 'well-ordered society' where 'each man works for others, while believing that he is working for himself'. Smith and Ricardo had probably inherited the normative conception of political economy from the Physiocrats: both 'were philosophic system-builders concerned to establish the nature of the laws underlying the total socioeconomic order – as it was and as it ought to be' (Deane 1978: 5). Two elements common to classical theories may be identified in the conception of society as divided into three classes – namely laborers, capitalists, and landlords – and in the idea that output value is determined by human labor. As will be seen, especially in Ricardo's *Principles*, profits, as well as wages and rents, will be conceived of, respectively, as the income of capitalists, laborers, and landlords. Also, according to Wood (1975: 10-11), 'it is not too fanciful to argue that the roots of the […] theory' of profit 'may be observed in the work of certain classical economists'. The Classicals may indeed be credited with having sought to develop a macroeconomic analysis of profits. They were in fact interested in studying the measurement of the value of a national or total product, and in understanding how it might be subdivided into wages and profit, as well as into income from land.

The idea that the global income in an economy is made up of two mutually complementary components, wages and profit, was rejected from approximately the 1870s onwards, when Léon Walras's general equilibrium theory of economics came to the fore

as an alternative to classical theory of the time – especially the analysis as expounded by Marx. Walras's theory marked the beginning of what, at the present time, is known as mainstream or orthodox economics. According to Pasinetti (1981: 12), the success of the neoclassical theory is likely to be due to the combination of two features of that time, namely Marx's *Capital*, and the 'widespread social unrest' in Europe. On the one hand, Marx's vision of the capitalistic system as a transitory phase from Middle Ages to a future socialistic system had distanced economic theory from the Classical theory, which had 'accepted the society in which they lived as part of the order of Nature' (*ibid.*). On the other hand, '[i]t is worth recalling that the whole of Europe had just been under the impact of shivering revolutionary waves', such as the formation of the first Socialist International in 1864, and 'the first communist revolutionary attempt ever to be made (the Paris Commune, March-May 1871)' (Pasinetti 1981: 13). These two features were likely to be perceived by the bourgeoisie as a threat to the capitalist system, and hence to the existence of bourgeoisie itself.

In his general equilibrium theory, Walras (1874 [1965]) concluded that, in equilibrium, profit must of necessity be equal to capital cost (interest), thanks to the introduction of the perfect competition hypothesis, while surplus (extra) profit would be null. According to Walras, the functioning of an economy depends entirely on a presumed equilibrium of the economic system, within which the problem of price determination is reduced to a relative exchange of products. Economic discipline is thereby distanced from the question of the creation of product value at a production level. Thus, neoclassical theory focuses its attention on circulation or exchange. Neoclassical theory is a theory that seeks to explain exchanges between exclusively real magnitudes, since, within it, money is relegated to the set of goods: money – the "numéraire" – is a real asset to be exchanged in the same way as any other product. Also, the significant break with classical theory, undertaken by neoclassical theory in general economic equilibrium, is to be identified in the reduction of labor market to product market (e.g. see Schmitt 1986 on this). Labor is treated as any other good: according to neoclassical theory at large, in fact, labor is meant as working hours or number of people employed

in a certain activity; further, labor is nothing but a factor, among many others, to which a price is given. This means there is a lack of causality between the creative factor of the global product – labor – and its effect – the product itself. This fusion of two markets involves the distancing of neoclassical economic theory from the idea that labor alone lies at the origin of the creation of value. An idea that was taken up by Keynes (1930a [1971], 1936 [1964]). As far as Keynes's theory is concerned, our aim here is to highlight aspects of the profit theory developed by the British author. Keynes's thinking is in line with the idea that profit, in modern economies, is the motor driving productive activities. '[F]or enterprise to be active, […] [t]here must be an expectation of profit; and it must be possible for enterprises to obtain command of sufficient resources to put their projects into execution' (1930b [1971]: 133). The importance Keynes gives to profit results in it becoming one of the central themes of his scientific research. As will be observed, Keynes's work triggered the rise of different economic traditions since 1936.

THE NEOCLASSICAL THEORY

The concept of economic growth pertains to one of the most important areas of research in modern economic theory. The Classicals had already sought to study those conditions that would allow output to grow over time, i.e. dynamically. Yet from the end of the 19th century and for the first half of the 20th century, economic analysis developed on the basis of static or short-run considerations. The neoclassical theory of general economic equilibrium and Keynes's research represent the most important examples of this tendency. The focus of neoclassical analysis during the early days was the determination of the relative prices of goods by means of equation-based systems. The early versions of the theory of marginal utility and marginal production also left no space for considerations of a dynamic type. Keynes's work was frequently criticized by modern authors of economic growth, inasmuch as Keynes studied employment trends in the short run, rather than analyzing its evolution in the mid- to long-run. Moreover, Keynes's analysis is said to be prevalently of a static type, not evolutionary.

Harrod's and Domar's studies of economic activity over the long run were, instead, a starting point for two different lines of thinking: the neoclassical theory of distribution and growth – including the neoclassical interpretations of Keynes's *General Theory* – and the post-Keynesian theory of distribution and growth. The neoclassical theory of distribution evolved to satisfy formal (mathematical) requirements, i.e. to facilitate the study of so-called production functions (analogous with utility functions) following methods used in mathematical analysis. The subdivision of income into wages and profit, in modern neoclassical theory, is dictated by essentially formal requirements taken for granted: nowadays the term 'profit' has even fallen into disuse in traditional economic theory; in its place, neoclassical economists favor the use of the word 'interest'. What is even more surprising is the fact that questions of a distributive type have been abandoned by neoclassical economists, who prefer to focus exclusively on solving the maximization problems present in the typical growth model founded on the concept of economic equilibrium. On the other hand, instead, a varied series of

models has arisen in the field of post-Keynesian theory, in which, while seeking to extend an analysis of the short run to the long run, income distribution has never ceased to be studied.

Despite the notable differences between contemporary neoclassical theory and non-Walrasian theories such as post-Keynesian theory, economic models from the last century belong, at least, to one of the following typologies: static or dynamic models; discrete or continuous time models; deterministic or stochastic models.

However, it should be remembered that, despite the overwhelming attention the concept of economic growth receives from economists, research into the short run has in no sense been abandoned. It is in fact true that, particularly from the 1980s onwards, so-called fluctuation theory has achieved a great success. The theory of fluctuations subdivides into two lines of research, though sharing the same methodology. On the one hand, real-business-cycle theory is based on the idea that output levels vary cyclically, following real shocks. On the other hand, new-Keynesian theory represents the most significant attempt to formalize Keynes's *General Theory* and, therefore, to study the possibility that output fluctuations are the result of nominal (monetary) shocks. Although the basic hypotheses are diametrically opposed, both theories resort to the use of so-called models of general economic equilibrium, these being of a stochastic and dynamic type (DSGE models). The use of such models in studying economic activity has been criticized by many authors belonging to schools of thought different from the neoclassical school, but, and this is not without significance, there is also opposition from within currents of traditional thought. For example, Solow's criticism of DSGE models (2010: 12) is well known:

I do not think that the currently popular DSGE models pass the smell test. They take it for granted that the whole economy can be thought about as if it were a single, consistent person or dynasty carrying out a rationally designed, long-run plan, occasionally disturbed by unexpected shocks, but adapting to them in a rational, consistent way [...]. The protagonists of this idea make a claim to respecta-

bility by asserting that it is founded on what we know about microeconomic be-
havior, but I think that this claim is generally phony. The advocates no doubt be-
lieve what they say, but they seem to have stopped sniffing or to have lost their
sense of smell altogether.

As noted by David Romer (2001: 174), an author who, like Solow, has never re-
jected the use of the concept of economic equilibrium, the subdivision into the two
types of fluctuation theories is an 'oversimplification', because it omits the possibility
that '*real non-Walrasian* theories' exist. According to the American author, in the
hypothesis that nominal shocks have no effect on output fluctuation, output variations
might potentially be explained by taking a distance ('departures') from the traditional
Walrasian model. Among aspects to be considered, he includes 'imperfect competition,
externalities, asymmetric information' and so on. However, even more interesting is his
idea (*ibid.*) that there are many more ways of approaching macroeconomics than those
that exist at present.

Profit at the outset of the neoclassical theory

From 1874 onwards, the market for 'production factors' – or 'productive services' –
becomes fused with the product market: labor, as well as capital, is conceived both as
means of production and as a commodity to be exchanged on the product market at a
given price. This means that labor is no longer the cause, or creator, of product value:
the transition from classicism to neoclassicism thus involves the cause being fused with,
or reduced to, the level of the effect (Schmitt 1966: 268). In Walras' view, productive
factors such as labor, capital and land are subject to exchange just as any other product.
Productive factors are thereby reduced to the level of products. A fundamental change is
thus enacted between classical and neoclassical theories: the Classicals considered labor
to be excluded from the commodities market, while in neoclassical theory labor be-

comes a good like any other. This implicit fusion of the two markets, undertaken by Walras, is the result of the fusion of productive activity and the activity of exchange or circulation. While in classical theory production precedes exchange, for the value of output is thought to be identified within the productive phase, in neoclassical theory the prices of productive 'factors' or 'services' and product prices are made to depend on the interaction between presumed supply and demand forces during the exchange phase (Schmitt 1986: 107).

Following Walras (1874 [1965]: 225), the characteristics of equilibrium during exchange are as follows. In equilibrium, the demand and the supply of production factors ('productive services') are equal, their defined price being 'stationary'. In equilibrium, the demand for goods equals the supply of goods, their price being stationary. A third characteristic concerns, instead, equilibrium in production: the selling price of goods and the costs of production factors are equal. Walras views equilibria as 'ideal' states, both because, in his opinion, the selling price of a product is never equal to its production cost, and because the supply and demand of factors and products are never equal.

With respect to his predecessors from the classical school, Walras introduces something of an innovation into his profit analysis: first and foremost, profit has a tendency to disappear. Let us consider the concept of equilibrium and its implications with regard to profit. Walras believes that the 'normal' state of things is equilibrium, a situation 'towards which things spontaneously tend under a regime of free competition in exchange and in production' (1874 [1965]: 224). In this theoretical state of an economy, 'if the selling price of a product exceeds the cost of the productive services for certain firms and a profit results, entrepreneurs will flow towards this branch of production or expand their output, so that the quantity of the product [on the market] will increase, its price will fall, and the difference between price and cost will be reduced' (Walras 1874 [1965]: 225). A search for maximum benefits drives the producer-seller to sell goods to the buyer-consumer. Yet general economic equilibrium theory does not allow for the formation of profit. In fact, the hypothesis that underlies the neoclassical

model of general equilibrium, and according to which companies operate in conditions of perfect competition, implies that by definition selling prices are equal to production costs: since there is no positive margin between selling price and production cost, it is impossible for profit to form (see Ullmo, 1969: 8-9).

Walras's theory had an enormous influence on the generations of economists succeeding him. Marshall was an example of this. Despite differences in interests, the technique used by neoclassical authors in all periods differs in no fundamental way from that employed by Walras and, earlier still, by Cournot: the technique of differential calculus applied to economics (see Hicks 1934: 338 on this). One of the model's more important hypotheses is to assume that an economy operates in a state of perfect competition. According to Walras, if the equilibrium is perfectly competitive, profits disappear. An entrepreneur's remuneration corresponds exclusively to the management of a productive activity. Marshall identifies such remuneration as the reward of the organization (Marshall 1920 [1961]: 138-9; see Hicks 1934: 338 on this).

Characteristics

During the 20th Century, Walrasian price theory was extended to various fields of application. To be noted among the most eminent formalizations of economic equilibrium theory, applied to utility theory, are those of Mosak (1944), Arrow and Debreu (1954) and Debreu (1959), which we propose here following Pasinetti (1986) and Mas-Colell, Whinston, and Green (1995). These are known as *pure exchange*, or *pure preference* models. The model in question is employed in the framework of the subjective theory of value to represent a *pure exchange economy*, in which price determination takes place during the exchange phase and not during production. Other economists, including Pasinetti (1981, 1986), prefer to call it a *pure utility* o *pure preference* economy, since it is a single individual's search for maximum utility or satisfaction that motivates the exchange.

Individuals are endowed with a set of resources. Each resource has its price. Resources are exchanged freely (in a competitive market). Each individual has a budget constraint: $p_1 x_1 + p_2 x_2 + ... + p_n x_n = p_1 X_1 + p_2 X_2 + ... + p_n X_n$, where $p_1, ..., p_n$ are the prices of each resource, $x_1, ..., x_n$ are an individual's resources prior to the exchange, and $X_1, ..., X_n$ are the same individual's resources following the exchange. Further, each individual has a 'complete and well-defined set of preferences' (Pasinetti 1986: 417). This means that a utility function exists with formal properties that must always be satisfied. Rational behavior allows individuals to maximize their utility functions, subject to budget constraints. From a mathematical point of view, the problem of maximization is resolved by building a Lagrange function (indicating by λ the Lagrange multiplier). First-order conditions allow us to locate the optimum point, and second-order conditions allow the point to be guaranteed as a maximum. First-order conditions are given by equality between zero and the first partial derivatives of the Lagrange function with respect to the quantity. Second-order conditions consist in constraining second partial derivatives to be less than zero, and allowing multidimensional hyper-indifference curves to be convex towards their origin. Having satisfied all second-order conditions, first-order conditions and budget constraint form a system of '$n + 1$ equations, which determine λ and the n physical quantities $X_1, X_2, ..., X_n$. This is the solution that defines the equilibrium of the single individual' (Pasinetti 1986: 418).

Now, this problem is used in every microeconomic test to establish the minimum expenditure necessary to buy a basket of goods that will provide an individual with a given level of satisfaction or utility. Solving the system of first-order conditions (marginal rate of substitution) is an obligatory step in defining the demand functions for each individual and for each resource. All demand functions have precise formal properties. That is, they exist and are differentiable if the utility function is strictly quasi-concave, and have zero-degree homogeneity with respect to prices and income. This means that, if prices and income vary in equal proportions, an individual's purchasing power re-

mains unchanged. By substituting the demand function in the utility function, an indi-
rect utility function is obtained, this being optimum utility (maximum).

Adding together individuals' demand 'for the same "resource"', we 'obtain the
aggregate demand function for that "resource"' (Pasinetti 1986: 418). To determine the
general equilibrium of the market, the following should be simultaneously considered:
equality between the demand function and the total amount available for a given re-
source; and market budget constraints. As observed by Pasinetti (1986: 418), the equali-
ty is achieved through 'n equations, which are, however, constrained by' the aggregate
budget constraint, 'so that they form in fact only *(n – 1)* independent equations. These
yield *(n – 1)* solutions for *(n – 1)* prices'.

In conclusion, in a situation of general economic equilibrium, it would appear
that relative prices are determined. While '[t]o determine also the absolute level of
prices, one should at this point go on to introduce money' (Pasinetti 1986: 418). How-
ever, this issue might deserve further study. Some authors, as will be observed shortly,
argue that in the neoclassical theory, the general level of prices, so-called absolute or
monetary prices, is indeterminate – in other words, the total value of production remains
indeterminate – and that relative prices cannot be determined either.

The indeterminacy of relative prices: a study

Neoclassical economists believe that value (or better, product price) is established
during exchange rather than production. Hence, the fundamental trait of the neoclassical
theory of general economic equilibrium is that it seeks to determine the relative or
exchange prices of a given number of goods. Namely, it seeks to find out the price of
one good in terms of another. In this theoretical framework, the general level of prices,
so-called absolute or monetary prices, is indeterminate. In other words, the total value of
production remains indeterminate. Yet, we shall argue that relative prices cannot be
determined either. Some proofs of the logical indeterminacy of relative prices are to be

found, for instance, in Schmitt 1984, 1996a, Cencini 1982, 2001, 2015, and Schmitt and De Gottardi 2003. We shall follow here Cencini (2005; 2015: 71-84).

It should be noted that in neoclassical theory the determination of relative prices takes place with no absolute value being established prior to exchange. This means that for neoclassicals there is no possibility that absolute prices, established during production, could determine relative prices (Cencini 2015: 71). What needs to be understood is whether it is possible for the value or monetary price of any individual product to be established, not prior to, but during the exchange process. Which is to say, it should be understood whether the common measure for products is determined during exchange (Cencini 2015: 71). Apparently, according to neoclassical theory, physically heterogeneous products become homogeneous thanks to exchange.

Consider an exchange of tables and chairs between agents A and B.

$$D \text{ tables} = O \text{ tables}$$
$$D \text{ chairs} = O \text{ chairs}$$

The price of tables in chairs is the inverse of the price of chairs in tables: the unknown is hence one and one only. If the equations were independent, the system would have to be considered as over-determined. This inconvenience is overcome by neoclassical authors by resorting to Walras's Law, according to which 'effective demand for or offer of one commodity in exchange for another is equal respectively to the effective offer of or demand for the second commodity' (Walras 1874 [1965]: 89). Thus, Walras's Law apparently allows the system to be reduced to an independent equation: given a system of *n* (demand and supply) equations, the system may be reduced to n-1 independent equations. In other words, in the example of tables and chairs, the two conditions

$$D \text{ tables} \equiv O \text{ chairs}$$
$$O \text{ tables} \equiv D \text{ chairs}$$

may be applied to the system, the result being that each equation reflects the other. The conclusion is that the price of tables in chairs – or, vice versa, the price of chairs in tables – is the system's single unknown and that the system of equations can be reduced to one single independent equation.

It is therefore reasonable to ask whether Walras's Law possesses a heuristic value or whether, instead, it is a simple truism. In fact, if Walras's Law proved to be a tautology, then it would be impossible to determine the relative prices in equilibrium. Indeed, relative prices would be logically indeterminate. This would in no way impede the successful outcome of single acts of bartering among individuals, although, from an economic point of view, the indeterminacy of exchange prices would have far-reaching effects on economic theory. In fact, it can be argued that, at the point of equilibrium, Walras's Law becomes a mere tautology. If this is the case, the neoclassical system of general equilibrium turns out to be over-determined. Indeed, during the hypothetical adjustment between supply and demand, these two "forces" can never be identical to each other. The consequence of this inequality, in marked contrast to Walras's Law, is that the number of independent equations is greater than the unknowns (relative prices). To claim that Walras's law remains true even during the adjustment process between supply and demand means that each and every virtual or hypothetical exchange price must be a price in equilibrium. However, this is in contrast to neoclassical theory, which states there can be only one point of equilibrium (see Cencini 2005: 38).

(i) First observation

If studying supply and demand at a potential point of equilibrium between the two 'forces' is far from simple, an even greater obstacle to be overcome is that of measuring supply and demand prior to exchange. In other words, the prices in equilibrium can be determined, being prices relative to a given quantity of a product compared to a given quantity of another product, only if there is *a priori* knowledge of the relationship

between both products. Yet how is this possible, which is to say, 'in what way may one establish how many tables correspond to an offer of 3 chairs *prior* to the determination of the relationship itself between chairs and tables?' (Cencini 2015: 73, our translation).

There is no logical solution to this problem. Walras's Law is of no help, because, prior to exchange, it provides no means of establishing the quantity of a good whose measure is a given quantity of another product. In the absence of Walras's Law providing useful information during the hypothetical adjustment phase between supply and demand, the general economic equilibrium system is over-determined: that is, the independent equations are numerically superior to the number of unknowns. The equations will always be at least equal in number to the number of goods to be mutually exchanged, but always greater than the unknowns: the number of relative prices will always be fewer (by one) than the number of equations. The system, 'in the case of n goods, is n times over-determined' (Cencini 2015: 74, our translation).

This conclusion is extremely significant and has two sides. In the example of tables and chairs, it should be noted that, on the one hand, no equations may be eliminated *prior* to exchange. On the other hand, an equation needs to be added that guarantees equality in the equilibrium prices of tables and chairs (Cencini 2015: 74, our translation). The system would thus result as follows:

$$D \text{ tables} = O \text{ tables} \quad (1)$$
$$D \text{ chairs} = O \text{ chairs} \quad (2)$$
$$\text{The price determined by (1)} = \text{The price determined by (2)}$$

It is possible to eliminate over-determination in the Walrasian system, by imposing an exchange ratio between goods. In this case, relative prices would be known automatically: prices would no longer have the status of unknowns and the aim of determining prices would be beyond reach. Neoclassical theory would thus be deprived of its main *raison d'être*, being that of determining exchange prices. In fact, 'the only adjustment to be entrusted to supply and demand forces would be that of the quantity exchanged at the

price imposed on the market. For example, if the price chosen were 1 table for 2 chairs, what remains to be determined is the total quantity of tables and chairs that the owners of these two goods would be willing to cede in their reciprocal exchange' (Cencini 2015: 74, our translation).

(ii) Second observation

Walras abandoned the classical concept of value as a physical dimension. Walras sees value in economics as being numerical.

Relative prices are expressed in terms of a *numéraire* and the transition from physical heterogeneity to economic homogeneity takes place when equilibrium is reached: Walras in fact believes that, in this equilibrium, the determination of relative prices guarantees that all goods have a common form.

Yet, in the neoclassical study of prices, one unresolved question remains: the heterogeneity of the goods that are the object of exchange. There are difficulties in claiming that relative prices render physically distinct goods measurable, since the equivalency relationship between two or more goods cannot in fact be established simply by means of their relative price (the price of one good in terms of another). The potential determination of relative prices does not, in fact, allow the physical heterogeneity of goods to be set aside, this being an unrealistic aim whenever the numeric price of a product is made to depend upon the exchange relationship between physical goods. 'To say that the (relative) price of 1 table is 2 chairs does not transform tables into chairs or chairs into tables. […] Relative prices are thus defined both physically (as an exchange relationship between distinct items) and numerically (as a numerical relationship)' (Cencini 2015: 75, our translation). Even if, for the sake of argument, we accept that (relative) prices are determinable, the cause-and-effect interaction between exchange relationships and numerical relationships does not stand up to logical scrutiny.

Let us examine this concept further. The question is whether numerical prices can be obtained, starting from prices defined in terms of real goods.

Schmitt (1998; see Cencini 2015) gives a negative reply to this question. The determination of the relative equilibrium price of a good compared to another means that both 'physical' and 'numerical' conditions must be satisfied for both goods:

(i) the supply and demand of any good must be equal;

(ii) the price of the quantity demanded and offered must coincide both for seller and buyer.

The two pairs of equations (two for each good), should allow the equilibrium price to be determined.

Therefore, in the instance of an exchange between two goods, the system in question is the following:

$$D \text{ good one} = O \text{ good one}$$
$$D \text{ good two} = O \text{ good two}$$
$$\text{Monetary price of good one for buyer} = \text{monetary price of good one for seller}$$
$$\text{Monetary price of good two for buyer} = \text{monetary price of good two for seller}$$

The solution of this system of equations should allow for the equilibrium price. However, analysis reveals an evident, insurmountable obstacle. Only three of the four equations/relationships are independent; one of the four, only, derives from the others. This would not represent an obstacle to determining the equilibrium price if the number of independent equations were equal to the number of unknowns. Unfortunately, there is only one unknown, while there are four equations (in total), of which three are independent.

The system is therefore over-determined and prevents the equilibrium price for each good from being determined. The over-determination of the neoclassical system

leaves no room for doubt concerning the question of numerical prices and prices in terms of real goods. '[I]t is impossible […] to state that the price of a given commodity is defined relatively to the commodity with which it will be exchanged and that commodities are measured by their numerical prices' (Cencini 2015: 76, our translation).

A conclusion immediately presents itself. If relative prices were determinable, numerical prices might also be determined, starting from relative prices. However, the demonstration that the system of equilibrium is over-determined (in generic terms, indeterminate) shows that it is impossible to obtain numerical prices for goods following the neoclassical approach. The indetermination of relative prices opens the way to a different path of investigation, which allows for the possibility that numerical prices are determined, not through exchange relationships, but in a direct way as a relationship between product and numbers. This, however, is not contemplated by the neoclassical theory, neither in the version proposed by Walras, nor in successive theories of economic growth based on the concept of economic equilibrium. This reasoning is by no means simple or easy; it may also be premature. However, the idea that prices may be expressed by simple (numerical) units of account (rather than exchange relationships between the quantity of one good compared to that of all the others, taken one by one) opens the door to a new approach to measuring products, one implying 'the introduction of a numéraire that is not a real good: bank money. As such, bank money is nothing other than a numerical form, completely a-dimensional and with no intrinsic value whatsoever' (Cencini 2015: 84, our translation).

Let us get back to our analysis and further develop it by studying the relationship between profit and interest in the neoclassical theory.

Profit and interest: a comment

The existence of profit allows companies to pay interest to capital owners (see Ullmo 1969: 28 and Schmitt 1984). According to Smith, the first classical author, interest is a

part of profit, being that part necessary to remunerate the owner of capital. 'The revenue or profit arising from stock naturally divides itself into two parts; that which pays the interest, and which belongs to the owner of the stock, and that surplus part which is over and above what is necessary for paying the interest' (Smith 1777 [1981]: 657). Generally speaking, all economists share the idea that interest is the capitalist's remuneration. Society, in fact, benefits from the increase in physical production enabled by the use of capital. However, other questions related to capital remain controversial.

First of all, although it is a common belief that profit and interest are bounded together, economists disagree with regard to the nature of this relationship. Obstacles arise as soon as a definition of profit is attempted. In fact, without finding an answer, economic theory puts the question as to whether profit belongs to capitalists, understood as the owners of capital, or to the entrepreneur, understood as the figure determining company activities. Moreover, although by no means an easy task, it must be established whether the role of the capitalist and the entrepreneur may be identified with that of the company, so as to understand whether the incomes of the former coincide with the income of the latter. It is, in fact, very difficult to clarify this matter, notwithstanding the work of major researchers into interest, among which are Smith, Ricardo, Walras, Wicksell, Böhm-Bawerk, Myrdal, Ohlin and Keynes. In order to explain the role of the capitalist, the entrepreneur and the company, the nature of profit as made by each of them must be investigated. That is, it is important to establish whether their incomes are newly created, i.e. production incomes, or whether they are derived or distributed incomes, i.e. of substitution.

According to classical authors, it is considered an established fact that profit is positive. So far as the Classicals are concerned, the existence of a positive profit allows interest to be paid to the capitalist. It is thereby company profit that allows the payment of interest to the capitalist. Walras believes that classical reasoning is mistaken. 'The theory of interest, especially that of the English School, [...] fails to distinguish between the figure of the capitalist and the figure of the entrepreneur. [...] That is why the term profit, as they use it, signifies simultaneously interest on capital and profit of enterprise'

(Walras 1874 [1965]: 423). According to neoclassical theory, a distinction needs to be drawn between the capitalist, understood as the individual who receives interest on capital, and the company. For neoclassicals, interest is the (positive) profit of the capitalist. 'Profits in the sense of interest charges on capital is defined as "a remuneration for the abstinence of the capitalist who has saved the capital"' (Walras 1874 [1965]: 423). In Walras's view, the role of the entrepreneur coincides with that of the company and should be distinguished from that of the capitalist. Walras maintains that the surplus profit of the entrepreneur-company system is null, since the profit of one individual corresponds to the loss of another. 'So far as profit is concerned, in the sense of profit of enterprise […], the English School fails to see that it is the correlative of possible loss, that it is subject to risk, that it depends upon exceptional and not upon normal circumstances, and that theoretically it ought to be left to one side' (Walras 1874 [1965]: 423). Walras's reasoning has been applied to all neoclassical theory of production and growth, according to which the 'cost' of capital coincides with the profit-interest of the capitalist. In this theoretical environment, company's profit is considered null.

Thus, classical and neoclassical theories do not draw a net distinction between the role of the capitalist, the entrepreneur and the company. Authors from the two schools of thought offer, above all, numerous explanations as to how profit is formed. In point of fact, even minimal reasoning and observation of our daily reality should be enough to raise doubts regarding the classical and neoclassical theories of profit and interest. It is by no means rare for the entrepreneur to be a company manager who receives a wage income (not profit), or a company shareholder who receives dividends. It is true, of course, that dividends originate in profit. But such profit does not belong directly to the entrepreneur. Generally speaking, entrepreneurs benefit only when some measure of profit is distributed to them through the payment of dividends. It is therefore reasonable to suppose that the figures of the entrepreneur and of the company should be conceptually differentiated one from the other. At first sight, the entrepreneur's income would appear to belong to the production income category, inasmuch as it is wage income; on the other hand, recipients of dividends, including the entrepreneur, receives

an income that is most probably a substitution income, since it derives from profit. What has been noted for the entrepreneur applies equally to the capitalist, who might well be either a manager or simply a company shareholder. However, the origin of profit as company income is still to be explained. By failing in this, classical and neoclassical theories fail to satisfy the need to explain the nature of incomes accruing to the entrepreneur, the capitalist and the company.

Profit in contemporary neoclassical models

Contemporary neoclassical theory unfolds around at least two lines of research: the theory of economic growth and the theory of fluctuations. Both areas of research have been developed starting from (formal) considerations concerning the redistribution of output into different income categories − the neoclassical theory of distribution. For full studies of contemporary neoclassical macroeconomics see, for instance, Solow (2000), Romer (2001), and Mankiw (2015), from which we draw some causes for reflection in the analysis that follows. We shall note that the assumptions of neoclassical models have not backed out of criticism. We shall bring to light a debate between neoclassical and post-Keynesian economists on productive techniques: the Cambridge controversies in capital theory. As profit is concerned, it seems to us no significant progress has been made in neoclassical models since the end of the XIXth century.

Economic growth and output fluctuations

The first neoclassical works on growth were carried out mainly in the second half of the XXth century, beginning with the Harrod-Domar model (see Harrod 1939, 1948, and Domar 1946). Neoclassical growth theory is therefore more recent than Walrasian price theory and the theories of marginal utility and productivity. The entire theory of growth

was developed with the aim of studying long-run trends in the national product, isolating such trends from possible short-run fluctuations. Therefore, the kernel of modern neoclassical theory is the growth of potential output. The reason economists distinguish between short-run phenomena and long-run trends is important. According to neoclassical theory, short-run output fluctuations and variations are determined by factors on the demand side. Long-run output growth are thought, instead, to be influenced by the supply side.

The features of the neoclassical model were developed with the aim of solving the Ramsey (1928) problem. 'The first problem I propose to tackle is this: how much of its income should a nation save?' (Ramsey 1928: 543). Ramsey's model represented a theoretical economy managed by an immortal planner who maximizes utility over an infinite period of time, given a particular technology. A large number of companies faithfully follow the plan of a single planner. There are two well-known versions of Ramsey's problem: the version described above, i.e. with a centralized or planned economy, and the version with a decentralized economy, in which companies act freely in perfect competition. Be that as it may, in both cases the economy follows an equilibrium path.

Growth models may be divided in various categories, each one delineated by an elevated level of related research. The main groups of models are the following.

> The *Solow growth model* (1955-6), or basic neoclassical model of growth. One of the main features of this model is technical progress, which is considered as exogenous to the economic system. This is to say, the evolution of productive technology takes place independently of considerations of an economic nature, as when, for example, one particular machine is substituted with another, more profitable one.
>
> *Infinite-horizon and overlapping-generations models*. See, for instance, Allais (1947), Cass and Koopmans (1965), Diamond (1965), Modigliani (1966), and Blanchard and Fischer (1989).

New growth theory. One of the main features of new growth theory is the inclusion of human capital and technical knowledge among capital goods. 'There are two kinds of capital, […] in the system: physical capital that is accumulated and utilized in production under a familiar neoclassical technology, and human capital that enhances the productivity or both labor and physical capital, and that is accumulated' (Lucas 1988: 39). Another important feature is that technological progress is taken as endogenous. See, for instance, Romer 1986, and Lucas 1988.

Money and growth. Generally, little is said concerning money in neoclassical models of growth. Neoclassical models are based on the concept of commodity-money. The literature is full of examples of these tendencies. For instance, Lucas (1988: 6) states: 'I will […] be abstracting from all monetary matters, treating all exchange as though it involved goods-for-goods'. However, studies by certain neoclassical authors exist containing observations on money (for a more in-depth view, see Tobin 1955, 1965, and Orphanides and Solow 1990).

From the 1990s onwards, many neoclassical authors have paid a great deal of attention to the theory of short-run output fluctuations. While the neoclassical theory of growth sets out to study the long-run evolution of output, the neoclassical theory of the medium run is based on the idea that output fluctuates regularly, following cycles with high and low points that alternate with each other over very brief intervals of time. More specifically, real-business-cycle (RBC) theory studies year-to-year increases and decreases in employment and output. Analysis undertaken focuses exclusively on the real aspect of economic activity: in this theoretical context, money in no way influences real economic activity – in other words, the hypothesis is that the only disturbances in an economy are of a real type. Fluctuation models are an elaborated version of Ramsey's model, given they include shocks and disturbances inserted into a long-run context of growth. It should be noted that all RBC models are no more than a single version, from among many, of the basic Walrasian model, being based on the concept of equilibrium

between labor supply and labor demand: employment levels are made to depend upon households' utility or satisfaction, which is a function of consumption and other variables – generally leisure time. It should also be mentioned that fluctuation models exist in two forms: one with an analytical solution and a more common version that, on the contrary, gives no analytical solution. See, for instance, Kydland and Prescott 1982; Hansen 1985; Christiano and Eichenbaum 1992; Eichenbaum 1992; and Baxter and King 1993.

Suffice to mention here some of the main features of neoclassical models. Although, in neoclassical theory, production is made to depend on an unspecified number of inputs, the factors considered are usually reduced to two or three: 'the factors of production are the inputs used to produce goods and services. Labor, land, and capital are the three most important factors of production' (Mankiw 2015: 374). Labor is understood as the number of people engaged in a given productive activity, and capital as the number of machines used in this same activity. It should be said that the theory is confined to the limited case in which a homogeneous commodity is produced, being destined for sale or accumulation. That is to say, labor and capital serve to produce a single typology of good that is partly consumed by purchasers and partly used as a capital good. Moreover, labor is taken as exogenous, while capital depreciates. It is useful to note that '[t]here is no special connection between the neoclassical model of growth and the determination of factor prices. The usual practice is to appeal to the same view of factor pricing that characterizes static neoclassical equilibrium theory' (Solow 2000: 378). This means that the formation of 'factor' prices, i.e. unitary wages and unitary interest (profit), is made to depend upon a certain number of equations and a number of unknowns inserted into a mathematical system, as is the case when determining the (relative) prices of goods. We previously noted that, according to some authors (see Schmitt 1984, 1996a, Cencini 1982, 2001, 2015, and Schmitt and De Gottardi 2003), in the neoclassical theory, the relative prices of goods and services cannot be determined, since the system of equations proves to be overdetermined. Analogy therefore leads us to conclude that, were this the case, the formation of prices for 'productive

agents' cannot take place. We shall, however, assume that factor prices are determinable and shall continue with our investigation.

Labor is supplied by households and, just as if it were a merchandise, a price is attributed to it; i.e. the wage rate – we shall avoid asking whether wages may truly be considered the 'price' of labor. Households acquire goods with the aim of maximizing their utility or satisfaction. In itself, the concept of utility is abstract and its objective measurement has little applicability. Yet, for the last few decades, growth theorists have introduced intertemporal utility functions into their models (see Cass 1965, and Koopmans 1965). 'The social welfare to be maximized is […] represented by the total of the discounted utility of consumption per capita, where a general concave utility index is employed' (Cass 1965: 233). Furthermore, households acquire goods subject to a budget constraint. It is assumed that disposable income is fully spent on the basis of well-defined preferences. On the other hand, company investment is finalized with the aim of maximizing profit, according to the technology available on the market. It is interesting to note that profit or benefit, in this theoretical context, corresponds to the difference between earnings and costs (defined via functions with their own properties). There is little else to add to profit in the neoclassical theory of growth. Indeed, 'the assumption of profit maximization by firms can be replaced by some other systematic criterion of behavior' (Solow 2000: 352), a criterion chosen arbitrarily. Moreover, the traditional neoclassical context assumes there is a regime of perfect competition (for labor and goods), in which companies are price-takers. The realization that in reality large interest groups are instead price-makers has led neoclassical theoreticians to a new formulation of the base model, assuming imperfect competition (e.g. see Romer 1990).

The reigning (mathematical) tool in the neoclassical theory of growth is the production function. Its characteristics, always true for the most widely-used production function, the so-called Cobb-Douglas (1928) production function, are highly restrictive. After all, 'it should be made clear that we do not claim to have actually solved the law of production' (Cobb and Douglas 1928: 164). The characteristics of returns to scale are well known and underlie the entire basic neoclassical model. In other words, the as-

sumption is that the physical product varies by a multiplicative factor t whenever each productive input is multiplied by this factor t. Moreover, it is assumed that the sum of the distributive quotas is always equal to the unit: if one quota diminishes then the other increases, and vice versa, in such a way that equality is always respected and, therefore, one productive factor may be substituted for another. The hypothesis of diminishing returns to scale of individual factors is also important. It in fact allows for productive inputs to be aggregated, as if they were a unitary and homogeneous productive factor. However, it must be said that defies understanding to imagine factors such as labor and capital could possibly be aggregated *as if* they formed a single homogeneous physical factor. Therefore the idea of the diminishing returns to scale of individual factors, as with those that are constant or diminishing, would appear to belong exclusively to a world that, according to Solow, does not correspond to the real one. One should consider the '[n]eoclassical growth model as being a story about an imaginary economy that has only one produced good that can be consumed directly or stockpiled for use as a capital good' (Solow 2000: 351).

The neoclassical theory of production, as studied nowadays in any microeconomics course, is based on a mathematical model whose aim is to minimize production costs, these being subject to an output constraint (see Mas-Colell, Whinston and Green 1995). Dealing with the problem of optimization would allow a solution in equilibrium to be reached for the consumer. The final objective is in fact to derive a function for the cost in equilibrium that provides the minimum production cost, given the prices of producer services (labor and capital, following the hypotheses of the model). The cost function may be studied over both the short- and long-term. All functions studied must possess particular properties. The cost function, for example, must be increasing with respect to output, increasing with respect to the prices of productive factors, homogeneous of degree one with respect to the prices of productive factors, defined negatively or strictly concave with respect to factor prices, the Lagrange multiplier being the marginal cost at the optimum point.

It should be observed that the neoclassical problem of optimization in the productive context was developed in perfect symmetry with the neoclassical theory of utility. In fact, it should also be noted that the study of individual utility involves an exercise in optimization in which a consumer spending constraint must be minimized given a supposed utility function. The problem can be solved by a system of equations. In fact, having constructed the Lagrange function, first- and second-order conditions can be derived, with the aim of obtaining the marginal rate of substitution, just as, in the productive context, the marginal rate of technical substitution is obtained. The marginal rate of substitution is then used to construct Hicks demand functions, which, substituted in the utility function, allow the minimum cost function to be constructed. All the functions studied, in symmetry with the production context, must possess particular formal properties in order for the optimization problem to be solved.

In both growth models and RBC models, output is subdivided into two parts: one that is consumed and one that is accumulated and used as capital. And so it is that the part not destined for consumption is invested. Otherwise said, investment always amounts to the sum of households' savings. Solow (2000: 356) states that consumption and investment take place on the basis of 'mechanical rules' or 'mechanical optimization procedures', in such a way that the sums for consumption and investment 'add up to total output'. This is a delicate matter: if the distribution and allocation of income are not sufficiently investigated, then neoclassical models can explain neither profit formation nor its link to investment.

The neoclassical theory of distribution: Pasinetti's critical account

It often happens, paradoxically, that the distributive aspect of the neoclassical theory is more often stressed by its critics rather than by its authors. This is what happened, for instance, in 2000, when Nobel prize recipient Robert Solow and post-Keynesian economist Luigi Pasinetti produced two articles, respectively on the neoclassical theory of

growth and distribution, and its critique. We propose the main critical points raised by the Italian economist.

Although the question of income distribution was already tackled at classical times, it still remains a controversial subject. The established marginal principle in the neoclassical theory goes back to the Ricardian principle of diminishing returns from land, which neoclassical authors extend to those elements that can be defined as productive "inputs" or "factors". Therefore, from the neoclassical viewpoint, an extension of the principle of diminishing returns to all presumed productive factors, such as labor and capital, renders the principle of diminishing returns from land a particular case within a wider theory. There is an enormous, fundamental difference between classical and neoclassical approaches: while classical authors believe the value of goods and services derives exclusively from labor, neoclassical economists think in physical terms, limiting labor to one among a few productive factors, together with land and capital. From Walras onwards, labor and, then, capital, were inserted into production theory in the same way in which Ricardo considered land.

The difference between the two approaches is substantial: although both are based on a physical concept of inputs and output, the causal relationship changes according to the theory under study. There is a clear symmetry between productive factors in the neoclassical theory – impossible, instead, in Ricardo's theory –, since they are placed on the same conceptual level. Translated into mathematical terms, symmetry is evident in the production function, developed initially by Wicksell 1901 [1934]. The properties of this function are well known, as are productive function typologies. What matters in terms of our discourse, is the way in which income is distributed within this theoretical environment. The first neoclassical models were based on the idea that physical production depended on quantities of land and the "quantity" of labor employed in productive activity. Given a unitary income from land, r, and the unitary "price" of labor, w, a typical budgetary constraint for this model was: $Y = rT + wL$. Output is thus distributed to land-owners and laborers in a complementary manner. Unitary wages and unitary income therefore complement each other. This means that

for the neoclassical theory rents and wages are two incomes placed on the same conceptual level: indeed, were labor to be absent, rents could still exist. The way in which unitary income and unitary wages are determined remains unspecified (as previously observed, their determination is entrusted to an explanation analogous to that used in explaining relative prices). There is even more: the hypotheses that the function is homogeneous and linear means that output distribution among the 'social classes' (laborers and land-owners in the example) in no way depends on the class that receives the residual income – i.e. the class that undertakes productive activity. The introduction of the two hypotheses allows for the equality $Y = (\partial Y/\partial T)\ T + (\partial Y/\partial L)\ L$. In the absence of any asymmetry, unitary income is rendered equal to the marginal product from land and unitary wages are rendered equal to the marginal product from labor. 'The temptation that naturally comes is to assume that F is precisely a function of this type, so as to make equality satisfied and coincidental with' $Y = rT + wL$ (Pasinetti 2000: 391). There is no logical-factual motivation justifying the use of this type of production function. In fact, merely formal considerations have induced generations of neoclassical economists to adopt the production function.

In order to create a production function that may be studied using the rules of mathematical analysis, other properties are attributed to this function. The hypotheses that the first derivatives of the function are positive and the second derivatives are negative guarantee that the function is convex. 'It turns out to imply constant return to scale and diminishing returns to the variation of the proportions between the two factors of production (a process which can be interpreted as a phenomenon of substitution between the two factors)' (Pasinetti 2000: 391).

> Whoever be the entrepreneur (who maximizes his own earnings), and whatever be the initial endowment of the production factors, a market with free competition will lead to such factors prices (i.e. to a wage rate and to a unit rent) which not only maximize the product, but also distribute to each factor of production

precisely its physical marginal product, without leaving any (positive or nega-
tive) residual to anyone (Pasinetti 2000: 391).

The reasoning behind land and labor factors may be extended to the case in which production is a function of an *n* number of factors. Neoclassical authors from the last few decades have advanced the hypothesis that production is a function of just two factors: labor and capital. The introduction of capital, *K*, into the production function is interesting for our own enquiry, since it has led to the introduction of profit into the neoclassical theory of growth. More particularly, profit or interest is identified with the part of income destined to the owners of capital. The basic relationship thus becomes the following, analogous to what we have previously stated concerning income from land:

$$Y = (\partial Y/\partial L)\ L + (\partial Y/\partial K)\ K$$

Where the marginal product of labor is equal to the wage rate, and the marginal product of capital is equal to the profit rate, π:

$$Y = wL + \pi K$$

Now, the majority of neoclassical models of growth are based on this distribution theory and are used to determine the policy of central banks. Yet, an aspect that should cast doubt on the practical usefulness of production functions is the equal way in which, at a theoretical level, neoclassical authors treat labor and capital (see Garegnani 1960, 1990), making them symmetrical to each other. One of the most well-known criticisms of such symmetry concerns incompatibility between the units of measure for the two factors and their prices:

In the case of a model with a single good (and only in this case), physical quantity and value happen to coincide, since the price of the product and the price of capital is the same price, ex hypothesis. In this case the asymmetry is not visible. The neoclassical production function (in this case, and only in this case) shows no logical inconsistency. But, as soon as we go over to the case of even a mere two-good model (e.g. one consumption good and one capital good), the neoclassical production function is no longer logically consistent (Pasinetti 2000: 403).

Further studies led to what was called as the "Wicksell effect" and the "Wicksell effect in reverse": namely, the marginal product of capital is not always necessarily equal to the rate of profit; the first could also be higher and lesser than the latter.

This was one of the issues largely studied in a well-known debate among economists from Cambridge, UK, and Cambridge, US (Massachusetts).

The Cambridge debates

During the 50s and 60s of the 20th Century (and, since then, sporadically), neoclassical theory was thought to have been seriously compromised by notable economists in the UK, inasmuch as the use of *heterogeneous* capital in an optimization exercise did not stand up to a critical analysis. However, the debate, known as the Cambridge controversies in capital theory, was forgotten. The debate mainly took place over a period of approximately fifteen years, starting from 1953. For a summary account of the controversy, see Birner (2002), on the basis, for instance, of Ferguson (1969), Harcourt (1972), Bliss (1975), and Compaijen (1981). See also, for instance: Robinson (1953), Champernowne (1953-1954), Robinson (1956), Samuelson (1962), Levhari (1965), Hicks (1965), Pasinetti (1966), Meade (1966a,b), Bruno, Burmeister, and Sheshinski (1966), Garegnani (1966), Samuelson (1966), Samuelson and Modigliani (1966a,b),

Brown (1969), Garegnani (1970), Ferguson and Allen (1970), Gallaway and Shukla (1974), Baranzini (1975), Sato (1976), Garegnani (1976), Burmeister (1980), Samuelson (1991), Miyazaki (1991), Baranzini (1991), and Kurz and Salvadori (1995).

The bone of contention was a two-sector production model with heterogeneous capital and fixed-coefficients. We take the description of the model from Birner (2002).

The model foresees the full employment of two productive factors or services: labour, L, and capital, K. Two typologies of goods are to be produced: consumer goods, C, and capital goods, M. Productive factor costs are represented by the following conditions, which must be satisfied contemporaneously:

$$a_{LM}M + a_{LC}C = L$$

$$a_{KM}M + a_{KC}C = K$$

where the four "a" denotes the labor and the capital used in the production of consumer and capital goods. Furthermore, technical production functions or 'activities' foresee that:

$$M = \min\left(\frac{1}{a_{KM}}K_M, \frac{1}{a_{LM}}L_M\right)$$

$$C = \min\left(\frac{1}{a_{KC}}K_C, \frac{1}{a_{LC}}L_C\right)$$

Different production techniques, or 'blueprints', involve the use of different capital goods: capital thus has a heterogeneous physical nature. This is one of the model's fundamental traits. The model in question foresees not only the use of factors with differing natures, i.e., labor and capital (and, from this, the problem of the unit of measurement, to be discussed later), but also capitals with different physical characteristics (as we shall see, this problem was the subject of controversy for the two Cambridg-

es). Techniques are described with 'different values for the input (or production) coeffi-cients' (Briner 2002: 15). Factor prices are the wage rate, w, and the rate of profit, r. Product prices are p_M and p_C.

The model goes back to the neoclassical concept of perfect competition: produc-tion costs therefore equal output prices. In mathematical terms, the conditions to be simultaneously satisfied are as follows:

$$a_{LM} wM + a_{KM} rp_M M = p_M M$$
$$a_{LC} wC + a_{KC} rp_M C = p_C C$$

The price of consumer goods is taken as the numéraire ($p_C = 1$). Hence, $p_M = p$. This allows the preceding two conditions to be reduced to the following:

$$a_{LM} w + a_{KM} rp = p$$
$$a_{LC} w + a_{KC} rp = 1$$

Having satisfied the preceding hypotheses, stationary equilibrium implies that the interest rate is equal to profit rate, just as Walras had theorized. For the sake of argu-ment, let us suppose this is always true. Furthermore, the model foresees that capital goods are infinitely durable.

At this point, the net final product per head (or net national product per head) may be defined, assuming one product only as the net final product of a technique. The final product per head is as follows:

$$q = w + rpk$$

with $q = C / L_C$ and $k = K_C / L_C$ (see Birner 2002: 16).

We may thus observe that capital is understood in physical terms (note the considerations on duration). It should also be noted that labor is expressed as the number of people employed.

We find that the wage rate is represented by a linear function that, analytically, takes the following form:

$$w = \frac{1 - a_{KM} r}{a_{LC} + Dr}$$

where $D = a_{LM} a_{KC} - a_{LC} a_{KM}$ is the determinant of the coefficient matrix.

Another hypothesis of the model, one at the root of criticism made by economists following lines close to Keynes, is the following. The production factors possess equal factor intensities. This means that the determinant of the coefficient matrix equals zero (D = 0). We shall see that the concept of production function fails to stand up to the test of inequality assumption (D ≠ 0). In (stationary) equilibrium and given a single consumption good produced:

$$q = w_{max} = 1/a_{LC}$$

for all the values of the profit or interest rate, r (see Figure 2.1).

FIGURE 2.1 *The neoclassical wage-profit frontier*
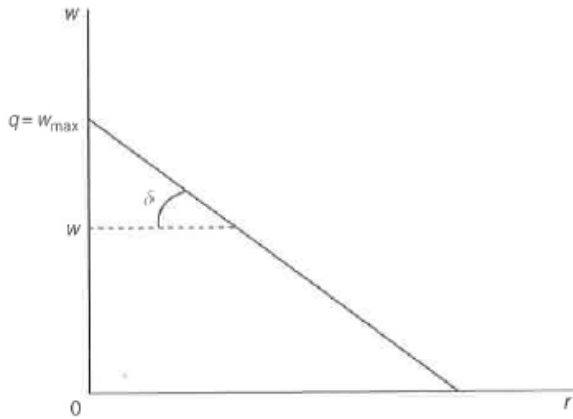
Source: *Birner 2002: 17.*

Note: The same figure is well described in Sraffa 1960 §30: 'we may say that, if R is the Standard ratio or Maximum rate of profits and w the proportion of the net product that goes to wages, the rate of profits is $r = R(1-w)$. Thus as the wage is gradually reduced from 1 to 0 the rate of profits increases in direct proportion to the total deduction made from the wage'.

The tangent *tg* of δ is equal to the value of capital per head, *pk*, or the capital intensity of a production technique:

$$pk = \frac{q-w}{r} = tg\delta$$

The following conclusion, drawn from the reasoning considered immediately above, is fundamental to the debate on capital. The profit maximization hypothesis ensures that, '[w]hen the rate of interest changes monotonically, a technique of production that had been profit maximizing never reappears after a switch to another technique has taken place' (Birner 2002: 18). This meaning that neither of the previous techniques returns after a more profitable technique is used (Figure 2.2a). There is an inverse relation between the profit or interest rate, *r*, and the capital intensity of each technique,

pk (Figure 2.2b). There is an inverse relation also between the profit or interest rate, r, and the final product per head, q (Figure 2.2c). A fundamental conclusion is that $q = f(pk)$ is a function. In fact, it is well behaved, meaning that there is only one value of q for one value of pk (Figure 2.2d).

Summing up, the fundamental assumption of the neoclassical model is that 'both sectors of production have the same capital intensity' (Birner 2002: 18), namely the same ratio of factor proportions (D = 0). Then, the wage-profit frontier is linear.

FIGURE 2.2 *Switches of techniques and the production function*
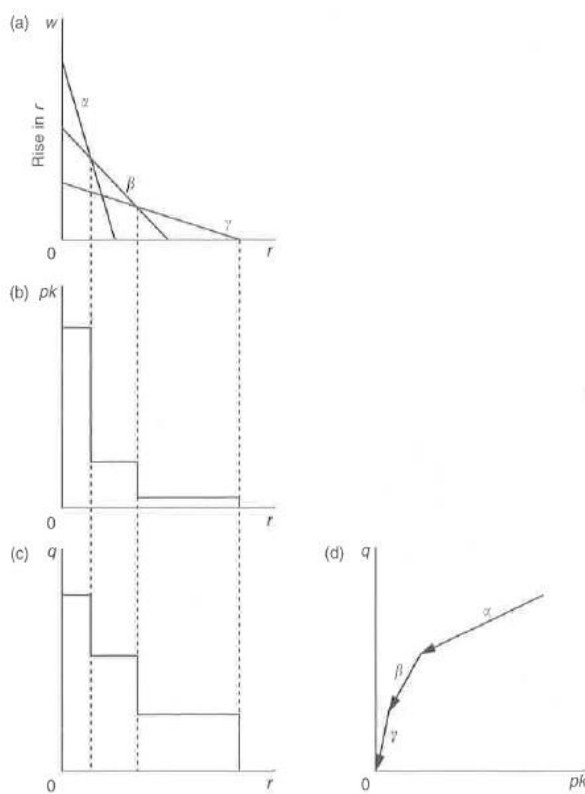
Source: *Birner 2002: 19.*

There is ample literature dealing with the debate, so we shall not dwell, here, on the details of the controversies. However, it is worth noting the principal conclusion of the academics taking part in the discussion: the use of capital as a productive factor within production functions is reduced, at a mathematical level, to the single instance in which a single capital good exists within the economy. This guarantees the *homogeneity* of factor *K*. Indeed, this conclusion was an outcome of the mathematical proof that, when dealing with heterogeneous goods, the so-called "reswitching of techniques" and "capital reversing" were possible, thereby confuting the neoclassical theory. 'Reswitching and capital reversing are phenomena, or, rather, theoretical possibilities, which are often said to contradict certain fundamental propositions of neoclassical production and capital theory' (Birner 2002: 14).

One of the fundamental hypotheses of neoclassical theory consists of an equal proportion between factors (D = 0). This effectively means that, with a given production technique, production in the capital goods sector is as capital intensive as production in the consumer goods sector. Yet economists following lines close to Keynes's demonstrated that, with a given production technique, if factor proportions are not equal among themselves, the wage-profit frontier is not linear. This result has far-reaching implications for production theory with heterogeneous capital. Graphs drawn up by critics of neoclassical theory differ from those previously presented (see Figure 3.3).[1]

Figure 2.3(a) represents a case of reswitching. There are two different techniques, α and β, that are profit-maximizing. Production adopts technique α and, then, technique β. Then production switches back to technique α again. Figure 2.3(b) shows that, as predicted by neoclassical theory, in r1 pk decreases. However, between r1 and r2, pk increases. This theoretical possibility is known as capital reversing or reverse capital deepening, in total contrast to neoclassical results. For r>r2, pk returns to the former level; this implies that there is 'no capital intensity uniqueness' (Birner, 2002: 19). Figure 2.3(c), instead, shows the so-called 'dip' in the living standard between r1 and r2. Then, after r2, q increases again, while Figure 2.3(d) shows that '[a]s r rises […]

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[1] See Ferguson 1969: 262 for a proof.

from 0, the values of the pair […] go through a sequence from α to β1 to β2 back to α and to the origin. Given the production techniques […], the production function is not a function' (Birner, 2002: 20).

FIGURE 2.3 *Switches of techniques and the non-production function*
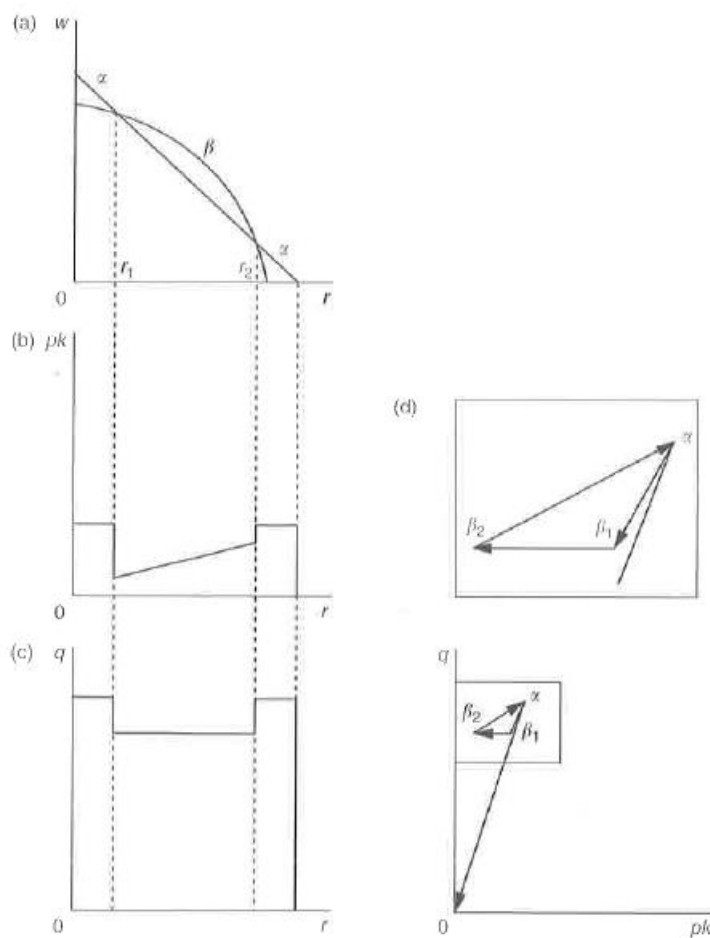
Source: *Birner, 2002: 20.*

The outcome of the two Cambridges debates shows the neoclassical production model stands up to formal proof only in the case in which capital goods are reduced to a

single homogeneous capital good. A basic observation that might be considered taken as granted, is that, in reality, capital, understood as instrumental goods, is physically heterogeneous, since a large number of instrumental goods exist.

A few observations by Birner (2002: 22) are worth mentioning here. The debate was characterized by static types of considerations, which may have pushed the controversy in one direction rather than another. Present day economists would probably have studied the question from a dynamic viewpoint. However, these are only suppositions, albeit suppositions of a certain importance. According to Solow (see Birner 2002: 24), Bliss was the first to mention explicitly that the question of dynamic processes was rarely investigated in the theoretical debates of the time. Despite sharing his opinion, it seems Joan Robinson never gave much importance to the question (*ibid.*). The fact is, at least until the 50s in the 20th Century, economic theory was characterized by numerous static analyses. Until that time, economists had not concerned themselves, instead, with changes in economic magnitudes. Early models that explicitly allowed for rates of variation in economic magnitudes began to be more widely used thanks to the success of certain models of economic growth (among which we should include Solow's, 1955-1956, 1956). It is unsurprising that economic models of the first half of the 20th Century were based on static theoretical frameworks rather than dynamic processes. In fact, both the economic equilibrium system proposed by Walras and Keynes's theory of the short term (1936 [1964]), which were dominant as the principal economic theories of the period, did not allow for changes in productive factors over time. Keynes's theory, for example, 'does not deal with the causes and consequences of changes in the capital stock' (Birner 2002: 22). With the aim of extending Keynes's analysis to the long term, Joan Robinson (1953; 1956) undertook lengthy research into capital accumulation. 'Joan Robinson […] made it her explicit goal to develop a theory of the long run which was to embed or encompass the short-run *General Theory* of Keynes' (Birner 2002: 22). However, her analysis remained tied to static considerations and was never completed with dynamic considerations. Robinson (1953) noted a particular case involving the so-called "reswitching" of techniques, in marked contrast to the neoclassical assertion that

production never switches back to old techniques. Furthermore, she also noted the possibility of "capital reversing", and this, too, was in marked contrast to the results of neoclassical analysis. 'But she did not draw the conclusion from this that the phenomena could better be dealt with in the framework of a dynamic theory' (Birner 2002: 23). At that time, the entire profession – from neoclassical to Keynesian theorists, broadly speaking – gave no thought to an in-depth study of changes in economic magnitudes. This was to happen later, when the focus shifted to the theory of economic growth. 'Robinson was not the only author who failed to break out of a static framework and pursue a process-oriented line of analysis further; everyone else did so' (Birner 2002: 23). At that time, economic models were comparative-static and 'not suited for analyzing processes, […] dynamic phenomena' (*ibid.*). Concerning the triumph of static analysis, it is sufficient, here, to remember an observation made by Hicks: '[t]he more precise capital theory became, the more static it became; the study of equilibrium conditions only resulted in the study of stationary conditions' (1965: 47 in Birner 2002: 22).

Now, possibly the most famous economist of the XXth century, John Maynard Keynes's theory came to the fore as an alternative to neoclassical economics. We will focus here on Keynes's analysis of profit in two of his most influential books: *A Treatise on Money* (1930a [1971]) and *The General Theory of Employment, Interest and Money* (1936 [1964]).

A TREATISE AND *THE GENERAL THEORY*

Keynes's *Treatise on Money* was published in 1930, and *The General Theory of Employment, Interest and Money* was published in 1936. In the *Treatise* Keynes writes about two types of profit: one corresponds to the entrepreneur's remuneration, which the author includes within his definition of income; another category of profit corresponds to the profit known as inflationary or "windfall", this being complementary (additive) to income and with origins in inflation. In the *General Theory* windfall profit is barely mentioned, being Keynes's attention paid to "normal" profit – included in income.

Before getting into our analysis of profits in the *Treatise* and the *General Theory*, a couple of observations are worth making. First of all, it must be said that Keynes wrote *A Tract on Monetary Reform* years before the *Treatise* – it was published in 1923. To be true, in the *Tract* Keynes dealt already with the issue of profit, and pretty in depth. Here we will not analyze that book, for we want to focus on the works by the late Keynes that most influenced economists' thinking since the 'Thirties of the XXth century. We must also observe that, at present time, one among the major experts in Keynes's works is Robert W. Dimand. A former doctoral scholar of Nobel prize recipient James Tobin, Bob Dimand wrote extensively, in particular, on the making of Keynes's theory, focusing on the years elapsed between 1930, when the *Treatise* was published, and 1936, the publication year of the *General Theory*. See, for instance, Dimand's 1988 book (based on Dimand 1983), in which the author dealt, among other topics, with the concept of quasi-rents. Keynes's analysis of quasi-rents was surely influenced by Marshall's theory and is a stepping-off point when studying Keynes's works. Nevertheless, in the following assessment, we decided to leave them aside, in order for us to focus on Keynes's conception of profit only.

Income and profit: Keynes's 1930 approach

In the *Treatise* (1930a [1971]), Keynes uses at least three expressions to refer to the concept of income: "the community's money income", "the earnings of the factors of production", and "the cost of production". It must be noted that, over the years, Keynes paid less and less attention to defining the term "community". The reader of the *Tract* (1923) acknowledges Keynes's specific attempt to subdivide the society of his time into social classes. In the *Treatise* and, then, the *General Theory*, Keynes was somewhat vague in this regard. One might argue – controversially enough – that the late Keynes was more prone to provide his readers with an analysis of incomes rather than social classes. In the *Treatise*, income is made up of wages, the 'normal remuneration of entrepreneurs', 'interest on capital', and '[r]egular monopoly gains, rents and the like' (1930a [1971]: 111). Let us suppose interest, gains, rents and the like to be null. This supposition should not be misunderstood. It is not proposed so as to remove an insurmountable obstacle, as done in other circumstances (e.g. see the case with capital heterogeneity in the neoclassical context in Hicks 1973). Rather, this supposition is purely for reasons of exposition. Interest, gains and the like may be studied without problem, but here we wish to limit ourselves to the sole study of profit.

Now, profit analysis, in the *Treatise*, is strictly tied to the definition of income. In the *Treatise*, Keynes does in fact identify two categories of profit. The 'normal remuneration of entrepreneurs' corresponds to the profit category defined as 'normal' and is included in his definition of income. Windfall (inflationary) profit, instead, makes up the second profit category identified by Keynes, this being the focus of his attention in the *Treatise*.

We will provide here the explanation of the formation of windfall profits as given by Keynes (1930a [1971]).

Windfall profits: Keynes's viewpoint

Possibly the most controversial and unresolved aspect of the *Treatise* concerns profit formation, with particular reference to inflationary profit. This topic is intimately linked to output price levels, a matter of great interest to Keynes in the *Treatise*. In fact, as Kahn (1984: 65) mentions, in the *Treatise* (1930a [1971]), Keynes is concerned with price-levels more than with output and employment levels: precisely the same Keynes who, in a memorandum in a letter to Ralph Hawtrey (28 November 1930), wrote that in the *Treatise* he was 'primarily concerned with what governs *prices*' (quoted in Kahn, 1984: 108).

Although Keynes dealt with this topic in the *Treatise*, his concept of inflationary profit is better understood by reading a different text to that of the *Treatise*, and which is to be found in Keynes's collected writings, edited by Donald Moggridge (1971-1989). We shall analyze it so as to cast some light on the matter. On November 21st, 1929, the Committee on Finance and Industry met for the first time. Also known as Macmillan Committee, it was designated by the British Government so as to find out the causes of the economic and financial crisis of the late 'Thirties. For instance, see Stamp (1931) and Moggridge (1992) on this. Between November, 1929, and the end of May, 1931, the Committee met one hundred times. J.M. Keynes was among the more active members of the Committee, together with R. McKenny, T.E. Gregory, R.H Brand and E. Bevin. The proceedings of these meetings echo Keynes's ideas in his *Treatise on Money*, published for the first time in October, 1930 (see Moggridge, 1971-1989: 38, XX). In fact, as emerges from the transcript of a Committee meeting, dated February 21st, 1930, and chaired by the Rt Hon. Lord Macmillan (see Moggridge 1971-1989: 66-93, XX), Keynes had a very precise two-fold conception of profit at that time.

The first category of profit corresponds to entrepreneur remuneration; such profit is in the form of wages. The other category of profit was defined, instead, as 'windfall'; it was considered of inflationary origin and was excluded from income (from wages). Keynes writes:

> I should explain that I use 'wages' in a very wide sense, to cover what econo-
> mists call 'remuneration of the factors of production'. Whether it is business
> men's efforts, or capital, or whatever it is, the 'remuneration of the factors of
> production' is very often convenient, though not quite accurate, to cover by the
> term 'wages'. […] Including profits […]; in the sense of the normal reward that
> a business man receives – not including windfalls (Keynes in Moggridge,
> 1971-1989: 45, XX).

Keynes is quite clear: national income is equal to the sum of total wages, inclusive of the normal profits of entrepreneurs. However, Keynes prefers to dedicate his attention to inflationary profits, which he adds to income in the excerpt mentioned above.

To explain his theory of inflationary profits, Keynes used an example he had developed together with the members of the Cambridge Circus. Importantly, the members of the Circus were Keynes's closest friends: Richard F. Kahn, James Meade, Austin Robinson, Joan Robinson, and Piero Sraffa. The group advised Keynes in the years following the publication of the *Treatise*, when Keynes began to develop his *General Theory*. This example is also found in the *Treatise*, in Chapter 12 ('A further elucidation of the distinction between savings and investment'). Keynes hypothesizes the existence of a society that possesses only banana plantations, on which it works. The members of this society consume only bananas and save part of their income: family savings are used to finance the production cost of new investment in extending the plantations. Thus Keynes states there is equilibrium between savings and investment, inasmuch as society's savings correspond exactly to the cost of new investment. Supposing that bananas are sold at a price equal to their cost, that individuals save more than before, and that, for various reasons, investment reaches zero, Keynes ponders what happens to such an economy. Keynes believes that, given all bananas must be purchased – because they rot quickly – society buys the full quantity although at a lower price, since, it should be remembered, savings have increased. The reduction in the price of bananas will be

proportional to the increase in savings. Because the price of bananas has fallen – although the quantity of bananas sold, and therefore production cost, remains unchanged – , '[w]hat will happen is that you have just as many bananas consumed as before, but the entrepreneurs will lose an amount equal to the new savings of those people who have saved' (Keynes in Moggridge, 1971-1989: 77, XX). The wealth of the society has not increased, despite individuals having obtained the same quantity of bananas as before at a lower price with a consequent increase in savings. In fact, family deposits are lent to entrepreneurs to offset losses. 'The continuance of this will cause entrepreneurs to […] reduce wages, and if they cannot reduce wages they will try to protect themselves by putting their employees out of work' (Keynes in Moggridge, 1971-1989: 77, XX). To deal with this problem, Keynes believes that, thanks to bank intervention, the use of savings in new investments can restore the equilibrium of savings and investment. Moreover, bank intervention can lead to an excess of investment over savings. This could cause inflation and the birth of windfall profits. If banks are successful in their purpose, for example, through variations in interest rates,

> you have an inflation. If people are able to borrow more [than] the equivalent of saving, prices rise above costs of production and the *entrepreneur* makes windfall profits and the extra investment that is created becomes the property of the *entrepreneur*. Owing to the rise of prices the consumer finds his money income worth less than he anticipated, the profiteer makes the profit and the extra quantity of goods represented by the extra investment […] belongs to the profiteer (Keynes in Moggridge, 1971-1989: 80, XX).

Keynes writes more on this in Chapter 16 of the *Treatise* ('A classification of the causes of a disequilibrium of purchasing power'), in which Keynes writes explicitly on matters proposed in the 'parable' concerning banana plantations: in fact, he writes that in the 'state of equilibrium in which the price level corresponds to the cost of production,

profits are zero'. In that case, it consequently emerges that 'the cost of investment is equal to that of saving' (Keynes 1930a [1971]: 231).

Keynes writes that 'profits […] having once come into existence become […] the mainspring of change in the existing economic system' (1930a [1971]: 126). Yet, let us repeat it once more, possibly the most important aspect of the *Treatise on Money* is the careful attention Keynes pays to a particular category of profit that is, instead, pathological. In fact, according to Keynes, windfall profits must be null if an economy is to be in the state Keynes defines as equilibrium. In Chapter 11 ('The conditions of equilibrium'), Keynes returns to, and make use of, the neoclassical idea of economic equilibrium (the influence of Alfred Marshall and Arthur C. Pigou on Keynes as an economist cannot be denied, at least until 1930, the year in which the *Treatise* was published). More specifically, Keynes studies the formation of inflationary profit in the theoretical context of economic equilibrium. In fact, in the following passage from the *Treatise*, Keynes writes:

> since the profits (Q) are the difference between the value of current output and E, its cost of production, we have Q = I-S so that entrepreneurs make a profit or a loss according as the money value of current investment exceeds or falls short of current savings. Thus we have profits = value of output − cost of production = value of investment − savings; profits being the balancing figure not only between cost of production and value of output, but also between savings and the value of net investment, both in terms of money. […] Now equilibrium requires that […] Q should all be zero (1930a [1971]: 136).

Therefore, as Keynes himself states, a prerequisite for a monetary economy to be in equilibrium is that '*aggregate* profits are zero' (1930a [1971]: 137). Whenever windfall profits are positive, there will be a 'disequilibrium' caused by the excess of the cost of production of investment over public savings: the 'disparity between investment and saving sets up a disequilibrium in the rate of profit' (Keynes 1930a [1971]: 138). 'We

may have a rise or fall of […] the total profits above or below zero, due to an inequality between saving and the value of investment. We shall call this *profit inflation* (or *deflation*)' (Keynes 1930a [1971]: 140).

Following a famous passage in the *Treatise*, windfall profits are repeatedly renewed over time. In fact, in the excerpt containing the examples of the 'widow's cruse', in the case of profits, or the 'Danaid's jar', in the case of losses, Keynes writes that windfall profits are spent infinite times and yet constantly restored:

> [i]f entrepreneurs choose to spend a portion of their profits on consumption […], the effect is to increase the profit on the sale of liquid consumption goods by an amount exactly equal to the amount of profits which have been thus expended. […] Thus profits, as a source of capital increment for entrepreneurs, are a widow's cruse which remains undepleted however much of them may be devoted to riotous living (1930a [1971]: 125).

Profit spent in acquiring consumer goods appears to replenish company deposits to an equal amount. The distribution or loan of such profit generates profit time and time again. The deeper reason behind this phenomenon is a controversial subject in economic theory. The most famous criticism of this passage of the *Treatise* originates from the Cambridge Circus. As Kahn recalls (1984: 106), '[t]he most important issue discussed by the Circus was what Austin Robinson called the '"widow's cruse" fallacy' and the "Danaid jar" fallacy'. As explained by Kahn (1984: 106), the widow's cruse refers to Holy Bible, I Kings XVII, and, among the members of the Circus, it was firstly discussed by Austin Robinson (1977: 34). As Kahn (1984: 106) puts it, '[i]n Greek legend, Argos, founded by Danaus, suffered every summer from a drought. In the lower world the fifty daughters of Danaus (the Danaids) had to carry water in broken vases'. The main criticism concerned Keynes's hypothesis that the level of consumption goods was fixed. As Kahn recalls (1984: 107), Keynes never explained why he had chosen a fixed level of consumption goods and, above all, he never explained how it might be possible

to subdivide the total output, O, 'between R, the sales of consumption-goods, and C, the output of capital-goods plus the increment of working capital and stocks' (*ibid.*).

The influence of the Circus was enormous and can be felt, for example, in Keynes's new preoccupation with research into the determinants for output levels, an interest already evident in his Harris Foundation lectures in June, 1931 (see Kahn 1984: 110; Moggridge 1973: 79, XX). In this context, Keynes showed a reduced interest in studying the determination of price levels, which, instead, had been an important line of enquiry in the *Treatise*. Keynes's *Treatise* is the starting point for successive studies. Keynes himself rejected the theory in the *Treatise* and starts formulating a new one. It took six years for Keynes to be able to publish another book, in 1936, in which he formulated a new theory of profit.

The importance of profit expectations

During the year following the publication of the *Treatise*, on various occasions Keynes defended the idea that inflationary profit is not included in national income (see, for example, his article published in November, 1931, in *Economica*). However, to judge from his correspondence and published articles between 1931 and 1932 (see Moggridge, 1971-1989, vols. XIII-XIV), we can note that Keynes began to reconsider his position.

Starting from 1932, Keynes changed the title of his lectures at King's College, Cambridge, to 'A monetary theory of production', marking the beginning of a new phase in his professional life. With regard to the theory expounded by Keynes up until 1930, from 1932 onwards he spoke openly about his reconsidered position in favor of new ideas, particularly concerning the level of employment. As confirmation of the new theory of production Keynes was formulating, he used the title of his lessons in an article in honour of Spiethoff, as well as in the early drafts of his new book. The book was published in 1936 by MacMillan with the title of the *General Theory of Employment, Interest and Money* (see, for instance, Moggridge 1992; Fontana and Realfonzo

2005). Following Carrera and Rossi (2015: 51), Keynes' *General Theory* was conceived with the explicit purpose, so far as Keynes was concerned, of laying down the basis for a critical theory on classical works. With the term *classical*, Keynes (1936 [1964]: 3) intended not only authors such as David Ricardo and James Mill, defined as such by Marx with this adjective, but also the generations of economists following on from Ricardo: namely neoclassical economists James S. Mill, Alfred Marshall, Francis Y. Edgeworth and Arthur C. Pigou. According to Keynes (1936 [1964]: v) the "fault" of orthodox economics lies not so much in the "superstructure", but in 'a lack of clearness and of generality in the premises'. The *General Theory* arose as an alternative to classical and neoclassical economics aiming to investigate the concept of 'output as a whole' (Keynes 1936 [1964]: vi). The book took six years to complete and, even after publication, Keynes continued to revise his own ideas so as to refine the concepts explained by him in the book and to establish an analytical interpretation that would best represent them for a wider readership. Despite no lack of criticism from the more "mature" economists, during the years following publication, the book enjoyed worldwide success, especially among younger economists, and the book influenced entire generations of economists (see Pasinetti 2007, on this point).

Keynes's ultimate goal was to explain what Dimand (1986: 441) identified as the 'weaknesses' of the *Treatise on Money*: namely, 'the lack of a functional dependence of saving on income, and the emphasis on realized windfall profits or losses rather than on the expected yields of investments' (*ibid.*). In fact – one of the fundamental messages of the *General Theory* – the inducement to invest comes from expected returns and not, from windfall profits. In any case, it remains true that without the *Treatise*, the *General Theory* would have been a different book (*ibid.*). In his *General Theory*, Keynes wrote that in the *Treatise* 'saving exceeded investment by the amount of the excess of normal profit over the actual profit' (1936 [1964]: 61). In his new book, instead, he did not opt for this idea, which he believed caused confusion among his readers:

I am afraid that this use of terms has caused considerable confusion, especially in the case of the correlative use of saving; since conclusions (relating, in particular, to the excess of saving over investment), which were only valid if the terms employed were interpreted in my special sense, have been frequently adopted in popular discussion as though the terms were being employed in their more familiar sense. For this reason, and also because I no longer require my former terms to express my ideas accurately, I have decided to discard them—with much regret for the confusion which they have caused (Keynes 1936 [1964]: 61).

Thus, there is an enormous difference between the concept of income developed in the *Treatise* and that dealt with in the *General Theory*. Keynes sought to develop an analysis of profit that was potentially clearer to the reader, compared to that proposed in the *Treatise*. Surprisingly enough, Keynes's analysis of profits is far simpler and shorter in the *General Theory* than in the *Treatise*. In his 1936 book, Keynes's longest arguments on profits are included in Chapters 6 and 12. These chapters are respectively related to income, saving and investment, and to the inducement to invest.

The type of profit Keynes studies in the *General Theory* is not the inflationary type to which he had, instead, dedicated his *Treatise on Money*. In the *General Theory*, Keynes focuses on the study of a single type of profit, which is included in income. However, one must also observe that the term profit is never found in the contents of the *General Theory*. In fact, Keynes's attention, broadly speaking, is given to the definitions, consumption, investment, and the relationship between money-wages and prices. These are the key elements of the general theory that Keynes was trying to develop. Moreover, Keynes gives less space in the *General Theory*, compared to the *Treatise*, to studying the determination of price levels, the central theme of his research being output levels (see Kahn 1984: 65).

Income and profit: Keynes's revision

Chapter 3 ('The principle of Effective Demand') of the *General Theory* contains an initial definition of profit as formulated by Keynes. He defines profit as the income of the entrepreneur. Obviously, this income is not the only one in the system. Total income is in fact given by the sum of profit and the "factor cost". This cost equals the remuneration of workers employed in productive activity. 'Factor cost and the entrepreneur's profit make up [...] *total income*' (Keynes 1936 [1964]: 23). Total income is thus given by the total sum of wages and profit: profit is included in national income, but not in wages. This is a traditional interpretation, yet in contrast to the classical idea, shared also by Keynes in the *General Theory* (see Keynes 1936 [1964]: 213–14; 1936 [1964]: Chapter IV), that labor is the sole macroeconomic factor in production and that wage-units therefore define the totality of national income. It must be pointed out that Keynes's conception of labor as *the* production factor − including the services of entrepreneurs − has not precluded Keynes and his traditional readers from arguing that income is made up of wages *and* profits. This is in line with Kalecki's accounting equation (see, for instance, Kalecki 1951, and Roncaglia 2005).

Maximizing profit plays a key role in productive activity. 'The entrepreneur's profit thus defined is, as it should be, the quantity which he endeavours to maximise when he is deciding what amount of employment to offer' (Keynes 1936 [1964]: 23-24). Employment is always determined, according to Keynes, by the profits entrepreneurs expect to realize following a certain productive activity. 'As I [...] think, [...] employment (and consequently [...] output and real income) is fixed by the entrepreneur under the motive of seeking to maximise his present and prospective profits' (Keynes 1936 [1964]: 77-78). Income, thus, depends on profit expectations.

Now, following Keynes, the desire to maximize profit is the motor driving the entrepreneur to manage productive activity. It would appear it is the need to accumulate capital, that is, to increase the value of machinery, that drives the entrepreneur into managing a company activity. In point of fact, the principal cause of an increase in

capital value is precisely the undertaking of profitable activity. 'We have dealt so far with that part of the change in the value of the capital equipment at the end of the period as compared with its value at the beginning which is due to the […] entrepreneur in seeking to maximise his profit' (Keynes 1936 [1964]: 56). All changes in capital levels are driven by profit expectations depending on the current profit rate: if profit are expected to change in the future, investment activities will vary accordingly.

A few considerations should be made concerning the topic of capital in the *General Theory*. First and foremost, in his reasoning, Keynes introduced the possibility that, following productive activity, the entrepreneur must deal with a change (positive or negative) in the value of machinery, independently of his own wishes. '[T]here may, in addition, be an *involuntary* loss (or gain) in the value of his capital equipment, occurring for reasons beyond his control and irrespective of his current decisions, on account of (e.g.) a change in market values, wastage by obsolescence or the mere passage of time, or destruction by catastrophe such as war or earthquake' (Keynes 1936 [1964]: 56). However, we are obliged to wonder whether it is really possible that capital value, measured in terms of profit, can change on the basis of events such as natural catastrophes. If it is in fact true that physical capital can be destroyed following a catastrophe, it is, however, equally true that monetary profit neither increases nor decreases. Monetary profit remains unchanged, with no links to the quantity or physical characteristics of fixed capital. Keynes did not pose this question and indeed defined the 'aggregate net income' as the difference between total income and the sum of two costs, these being the 'supplementary cost' and the 'user cost'. In the second place, Keynes avoided giving a clear definition of the nature of consumer goods and investment goods. Kahn (1984: 71) noted this problem. Keynes' decision not to define consumer goods and investment goods in relationship to the sharing of output in wages (nominal and real) and profit, is unsurprising. Keynes had already decided to act in this way in 1932, given that his main preoccupation was, instead, that of attempting to explain the relationship between the supposed 'elasticity' of wages and of profits. These statements can be supported by a letter from Joan Robinson to Keynes, dated May, 1932 (see Moggridge 1971-1989: 47,

XXIX). We read: 'I quite agree that there is no reason to divide goods in[to] capital and consumption and say that their elasticities are likely to be different, but at the same time you are unnecessarily tying your hands by adopting a method which forces you to assume that the elasticities are related in one particular way'.

On the basis of the *General Theory*, entire generations of economists started developing several studies on profit and capital.

KEYNESIAN TRADITIONS SINCE 1936

There have been numerous studies of income distribution and growth on the basis of Keynes's *General Theory*. Although it is reductive to attempt to catalogue such work, developments from the 1930s onwards may be subdivided into two broad lines of research: neoclassical interpretations of the *General Theory*, and post-Keynesian models. The first stream of thought is neoclassical in tone, being based on the concept of economic equilibrium. Post-Keynesian authors, on the other hand, criticize the neoclassical framework. Despite the differences between the two approaches, potentially the most widespread idea among Keynesians, by and large, is that within every economic system nominal disturbances exist to which wages and prices fail to adjust quickly. This causes fluctuations in output and employment. That is, a phenomenon would exist that is called "incomplete – or sluggish – nominal adjustment". In the following pages, we propose an analysis of profit following both lines of research. The first line of thought is based on the Walrasian concept of economic equilibrium. In this particular theoretical context, profit is identified with interest. In post-Keynesian theory profit is once more studied with the same level of attention as that paid by Keynes: in this theory, profit is once again studied as if it were a complementary income, additive, to wages.

Profit lost: neoclassical versions of *The General Theory*

The principal neoclassical interpretations of the *General Theory* involve several lines of research (see, for instance, Modigliani and Papademos 1990, and Romer 2001). Given a full range of Keynesian models with a neoclassical lineage, the most successful embody neo- and new- Keynesian theories. We shall give a brief description of the features of these lines of research.

Neo-Keynesian models

Major attempts to formalize the *General Theory* within the so-called neo-Keynesian framework are found in Harrod (1937), Hicks (1937), Meade (1937), Lange (1938), Modigliani (1944), and Leijonhufvud (1967). Although there are differences between traditional neo-Keynesian theory and pure neoclassical theory (see Mankiw 1990: 1654, 1659), they share common elements (see Coddington 1976: 1265; Blinder 1988: 280). The former is, in fact, a variant of Walras's theory of general economic equilibrium. What neo-Keynesian authors are attempting is to generalize the *General Theory* through the use of a mathematical model, but '[b]y replacing the identities with conditional equalities, Keynesians have […] transformed Keynes's theory into a particular case of the more general framework of neoclassical analysis' (Cencini 2005: 44). The development of neo-Keynesian theory begins with the IS-LM model (Hicks 1937) and is present in two versions: one focused on closed economies and one on open economies. The authors of this theory assume price rigidity – prices as given – and an almost total rigidity of wages, with the aim of studying aggregate demand. The assumption is indeed that trends in demand influence the productive choices made by companies. Profit has never played a key role in this theoretical environment. It must be observed that models exist in which the fundamental hypotheses of neo-Keynesian economists have been modified. For example, such alternative models are based on different hypotheses concerning the behavior of prices and wages, as well as on forms of imperfect market. '[D]ifferent combinations of wage rigidity, price rigidity, and non-Walrasian features of the labor and goods markets yield different implications about the effect of shifts in aggregate demand on output, unemployment, the real wage, and the markup' (Romer 2001: 218).

It is worth noting that all neo-Keynesian models, as well as the alternatives – which, however, refer back to the former – are based on a physical concept of money, as if it could be defined as a commodity. The majority of neo-Keynesian authors have never abandoned this concept. An example would be Modigliani, who, in the text co-

authored with Papademos (1990), bases his analysis '[o]n the assumption that money is a quantity which can be uniquely defined' (*ibid*.: 400). Yet a fundamental difference between neoclassical and neo-Keynesian authors should be noted: although they all share a physical conception of money, neo-Keynesian authors, contrary to neoclassical economists, believe in the "monetary transmission mechanism". Namely, they believe that the real side of the economy may be influenced by monetary shocks through certain specific mechanisms (*ibid*.). They seek to develop monetary policies aimed at controlling nominal income. Such policies are made to depend 'on behavioral and institutional characteristics of the economy as well as upon the stochastic nature of the environment' (*ibid*.: 401). Assuming this objective to be achievable, Modigliani and Papademos' observation is worth noting, according to which this objective is shared by schools of thought differing from that of neo-Keynesians, such being, for example, the classical, monetarist and post-Keynesian schools. The two authors in fact undertake 'a review of four basic stochastic models relating the quantity of money to nominal income. These include classical, Keynesian and monetarist models, and a representative post-Keynesian aggregate demand and supply paradigm incorporating the effects of expectations and price dynamics' (*ibid*.).

It is interesting to note that certain neo-Keynesian authors have themselves advanced criticisms of this theory. Famously, Hicks, during the mature phase of his life, distanced himself from his own 1937 Walrasian representation of the *General Theory* (Hicks 1975, 1980-1981; Pasinetti 2007: 44). Equally interesting is the fact that Modigliani, during the final years of his life, was considering a personal formalization of Keynes's research (see Pasinetti 2005: 29). It is, in fact, interesting to note that Modigliani and Papademos (1990: 463) propose a model in which income is expressed in terms far from being neoclassical. An interesting assessment of this model is given in Graziani (2003: 74). In this context, profit regains the centrality it held in classical texts and in Keynes's *General Theory*. In fact, the function in question takes the form:

$$Y = W + P$$

Output, *Y*, would be given by the total for wages, *W*, and profit, *P*. As is known, this function was not invented by neo-Keynesian authors. It was Kaldor (1956), we will see, who used such an equality, transposing the definition of income given by Keynes (1936 [1964]) into symbols. We shall now continue with an analysis of the second group of Keynesian models sharing a neoclassical lineage.

New-Keynesian and other models

The following three categories of models are based on the idea that wages and prices do not fully, or immediately, adjust to monetary shocks. In other words, wages are sticky, especially in models less similar to the basic Walrasian model, and in which it is assumed that, for example, the goods and labor markets are imperfect. Furthermore, variations in the real side of the economy are due to monetary disturbances. Following Romer (2001), these lines of research have been carried out by Phelps (1970) and Lucas (1972), by the authors of so-called "staggered adjustment models" (e.g., see Akerlof 1969, Phelps and Taylor 1977, Taylor 1979, and Caplin and Spulber 1987), and by new-Keynesian authors (see, for instance, Rotemberg 1982, Akerlof and Yellen 1985, Parkin 1986, and Blanchard and Galì 2007).

It must be observed that new-Keynesian models work with the hypothesis that supposed nominal frictions or imperfections are able to cause produced output and employment to fluctuate in cycles close to each other. To a certain extent, these models are analogous to real-business-cycles (RBC) models. To be more specific, new Keynesian theory uses the same analytical techniques as those employed in RBC models, i.e. dynamic stochastic general equilibrium (DSGE) models, in studying short-run output fluctuations.This line of research is based on the IS-LM model typical in neo-Keynesian theory. 'New Keynesian macroeconomics has pushed the idea that traditional IS-LM analysis remains the best way to think about the determination of aggregate demand'

(King 1993: 80). Despite internal criticisms (see King 1993), new-Keynesian authors generally focus on the development of the IS-LM model within DSGE models that are used by central banks with the aim of elaborating national bank policies. For instance, Blanchard and Quah (1989) elaborated, amongst others, equations for the IS and LM curve, thereby solving a problem of dynamic optimization. These three lines of research afford no significant new contribution to the neoclassical theory of profit.

Profit regained: post-Keynesian theories

Post-Keynesian literature is rich and dealing with many lines of inquiry. Some of the most influential and well written works include Kaldor (1956, 1966), Pasinetti (1962, 1973), Harcourt (1969, 1972), Baranzini and Harcourt (1994), Harcourt and Kriesler (2013), and Baranzini and Mirante (2013). These texts will be our main references in the pages that follow.

Domar (1946) returned to Ricardo's studies, adding new hypotheses relating to population growth rate, technological development and Keynes's theory of the effective demand. As well stated by Pasinetti (1973: 224), the starting point for the Cambridge theory of growth was the classical research, with the addition of certain new ideas such as: a constant rate of population growth, rather than a Malthusian-like behavior, a likely increase in income per capita also when progress is technically neutral, and 'Keynes's theory on effective demand' (*ibid.*, our translation). Domar's famous article, published in *Econometrica* in 1946, was an important contribution in this direction. Domar (1946: 138) defined aggregate real production, or the 'productive capacity of an economy (or an asset)', as 'its total output when all productive factors are fully employed […]'. Furthermore, he stated that '[t]he economy will be said to be in equilibrium when its productive capacity P equals its national income Y' (*ibid.*). Moreover, the dynamic state of equilibrium requires income and productive capacity (which is to say, the stock of capital) to grow at the same rate. These two conditions are necessary for income (or

production) and productive capacity (investment) to increase at the same speed, '*pari passu* over time' (Pasinetti 1973: 225, our translation). Once these conditions have been met, Domar identified what he called 'the state of dynamic equilibrium', according to which the growth rate of net investment, *g*, was given by the relationship between the marginal tendency to save, *s*, and the quotient of capital / product, *k*. The state of dynamic equilibrium is given simply starting from equality between (i) the relationship between income and investment (the equation for the multiplier) and (ii) the relationship between productive capacity, *P*, and investment (the equation: *(1/k)I = (dP)/dt)*).

Domar's analysis represents a breaking-point, initiated by Keynes, between the Cambridge theories and the classical tradition. Following lines laid down by Keynes, Domar realized that by focusing attention on the 'size of the labor force', understood as 'man-hours worked', as well as on the productive capacity of labor, economic theory was 'incomplete', being unable to explain the functioning of modern economic systems and, above all, the underlying reasons for mass unemployment. According to Domar, the question of demand is often overlooked and remains unexplained: 'since an increase in labor force or in its productivity only raises productive capacity and does not by itself generate income […], the demand side of the equation is missing' (Domar 1946: 138). The state of dynamic equilibrium proposed by Domar 'expresses the full utilization of capacity over time', without, however, explaining full utilization (Pasinetti 1973: 225, our translation).

At the same time as Domar, Harrod (see e.g. 1939, 1948) sought to contribute to research into full employment, attempting to extend Keynes's analysis (and that of Domar) to the long term (see Pasinetti 1973: 225, King 2009: 59-60). Harrod developed the concept of the 'natural rate of growth', g_n, given by the sum for the growth rate of the population and the growth rate in productivity. If the natural rate of growth, g_n, is equal to the growth rate for net investment, *g*, the employment level is considered to be that of full employment. Proceeding by substitution, full employment is thus met by the conditions imposed in the equation known as the Harrod-Domar equation, $g_n = s/k$.

As Pasinetti notes (1973: 226), the Harrod-Domar equation presents a problem of practical importance, which has been called the "knife-edge" problem. If g_n, s and k are constant, 'balanced growth would be possible only by following a narrow path' (*ibid.*, our translation). The model proposed by Kaldor in 1956 aimed at overcoming the 'knife-edge' issue raised by the Harrod-Domar model. Other studies along the lines of Harrod and Domar were undertaken by Kaldor and, later, by Pasinetti. They enjoyed an enormous success at the time. The development of the neo-Pasinetti theorem (see Kaldor 1966) represents the culmination of Kaldor's and Pasinetti's joint research.

Further below we shall analyze, and briefly comment on, certain aspects of seminal post-Keynesian studies. Despite hundreds of studies have been carried out since the first years following the publication of Keynes's *General Theory*, we shall focus on Kaldor's and Pasinetti's profit theory, for they are among the very first and most influential post-Keynesian authors.

Kaldor: profit as a type of income

The most notable of the early works developed in the Keynesian tradition is Nicholas Kaldor's (1956) paper on 'alternative theories of distribution', where he investigates the relation between profit, output, wages, and saving rates out of wages, s_w, and out of profits, s_p. His intention is to improve economic analysis beginning with what he was later to define the '[c]osy world of Harrod, Domar and Solow, where there is only a single saving propensity applicable to the economy – where in other words, $sY = s_w Y$ ' (Kaldor 1966: 311). The theory behind the model in question took several years to develop, albeit one of the theoretical bases of Kaldor's famous article from 1956 was already to be found in a text, by him, from 1951 (see King 2009: 62). Kaldor (1956) proposes an analytical formulation of Keynes's (1936 [1964]) monetary theory, starting from Keynes's definition of *total income*. With the starting point of Keynes's (1936

[1964]: 23) definition of total income as the sum of the "factor cost" and profit, Kaldor (1956) analytically defined national output as the sum of wages and profit.

Kaldor (1956) develops the following mathematical formulation of Keynes's theories: $Y = P + W$ and $I = S$, being investment defined as the sum of saving from wages and saving from profit:

$$I = s_p P + s_w (Y - P) = (s_p - s_w)P + s_w Y$$

and where Y is economic output; P stands for profit, and W for wages; I and S are supposed to be equal to saving from wages plus saving from profit. Observe that 'the wage-category comprises not only manual labour but salaries as well, and Profits the income of property owners generally, and not only of entrepreneurs' (Kaldor 1956: 95).

We stress the fundamental restriction in Kaldor's model: $0 \leq s_w \leq s_p \leq 1$, that is, the saving rate of wages is lower than the saving rate of profits and their value less than one, zero and one included. Kaldor (1956: 95) justifies this restriction by stating that 'if $s_p < s_w$, a fall in prices would cause a fall in demand and thus generate a further fall in prices, and equally, a rise in prices would be cumulative'. Kaldor believed that entrepreneurs' savings were to be added to those of households and that their combined sum determined the amount of investment. It was Keynes who had advanced the hypothesis that investment was determined by the total for individuals' savings and savings from profits.

Believing the rate of saving, s, to be variable rather than constant, with the classical hypothesis that saving from wages is null, Kaldor's investment equation, substituted in the Harrod-Domar equation, gives rise to the equation: $P / K = (1 / s_c)g_n$. This equation became famous as the 'Cambridge equation' (see Pasinetti 1973). The result achieved by Kaldor consisted of determining, in the context of the 'Cambridge profit rate theory', the relationship between profit (or, better, the percentage of profit with respect to income) and the exogenous magnitudes s_c, k, and g_n: 'it is wages, hence,

according to Kaldor (and not profits, as argued by Ricardo), to be determined as a residual. [...] According to him, it is profits, not wages, to be determined by exogenous forces, and it is workers, not capitalists, to receive what is left. [...] The requisites of effective demand prevent capitalists from "appropriating of all the surplus"' (Pasinetti 1973: 227-228, our translation). As Pasinetti explains (1973: 228-229), certain neoclassical economists, among which James Meade, Franco Modigliani, Paul Samuelson and Robert Solow, commented on the question of economic growth and distribution as developed by economists from Cambridge, UK. See, for example, Solow (1956). The quotient of capital / product, k, is viewed as a variable, not a constant. Studied in the context of neoclassical production function, k is a function (inverse monotonic) of profit rate, which, as previously seen, coincides with interest rate in neoclassical theory. Profit rate is equalized with the marginal productivity of capital, while the rate of wages is equalized with the marginal productivity of labor. In this analytical apparatus, the relationship $k = s / g_n$ is deemed valid, where k is variable.

The question Kaldor returned to in the 1950s was not new in the history of contemporary economic thought (see, for instance, Dobb 1929, 1930a,b [1971], Kalecki 1939 [1990], 1942, Robinson 1956, and Hansson 1987, quoted in King 2009: 63). Kaldor, in fact, sought to formalize the idea that the distribution of income in the form of profit could 'provide the necessary increase in saving' to finance investment (King 2009: 63). In the late 1960s, Kaldor had attempted to reconcile the problem of income distribution with that of economic growth.

Pasinetti: profit as accruing to 'social classes'

It should be noted that Kaldor's 1956 paper became the focus of critical attention in the 1960s. Assuming that workers earn labour *and* property incomes, Pasinetti's 1962 model achieved the same results as Kaldor's (1956), therein stating that, independently

of workers' propensity to save, the share of profit is determined by the propensity to save of the capitalists.

Pasinetti (1962: 270) rewrites the equation, which he identifies as 'the equilibrium condition', as:

$$I \equiv s_w(W + P_w) + s_c P_c = s_w Y + (s_c - s_w)P_c$$

being Y 'net income' (Pasinetti 1962: 268), being I 'the amount of investment necessary to cope with population growth and technical progress' (*ibid.*), and 'where P_c and P_w stand for profits which accrue to the capitalists and profits which accrue to the workers, and where s_c and s_w are the propensities to save of capitalists and workers respectively (Pasinetti 1962: 270). The relevance of Pasinetti's research (1962) in the context of post-Keynesian theory is due to the fact that profit rate appears to be determined as explained by the 'Cambridge equation', even when s_w is positive in the long term. Thus, the results achieved by Kaldor would appear to be confirmed by Pasinetti's study, according to which, independently of workers' rates of saving, '[w]hereas capitalists are in the system, it is their propensity to save (and theirs only) the one relevant to determine the profit rate in the long run' (Pasinetti 1973: 230, our translation). On this subject, see, for instance, Harcourt (1969, 1972) and Baranzini and Harcourt (1994).

Pasinetti's outcome has been widely studied, as it showed that, under the hypotheses of the model, profit rate equilibrium does not depend at all on workers' behavior, even when saving rates of wages and profits are positive. Equilibrium profit rate would in fact be determined by capitalists' behavior – i.e. by their rate of saving – and the economy growth rate (e.g., see Baranzini and Mirante 2013: 289). With Pasinetti's research as a starting point, an important debate arose that resulted in an article by Kaldor in 1966, containing the so-called Kaldor-Pasinetti theorem or neo-Pasinetti theorem.

There were numerous reactions to Pasinetti (1962) and Kaldor (1966). On the neoclassical front, skeptics about Pasinetti's and Kaldor's results developed the so-

called "dual-theorem". The model's results are extremely clear, and symmetrical with results obtained by Pasinetti and Kaldor. Using the theoretical hypothesis that the economy is on the steady growth path – being, therefore, a theory of long-run equilibrium –, the output capital ratio is determined by the saving rate of workers – the only saving class in the system –, together with the growth rate. See Meade 1963, 1966a, 1966b, Samuelson-Modigliani 1966a, 1966b, Pasinetti 1989, and Baranzini and Mirante 2013 on this.

Discussions led particularly to the so-called Cambridge capital controversy. Even after many years, despite neoclassical theory being seriously weakened by such controversy, the general theory of economic equilibrium remains the dominant theory in university courses. The reasons for the neoclassical success are disparate and dealing with them risks being no more than speculation. Most importantly, it would not be germane to the subject in hand. It is enough, here, to note that hundreds of studies followed what has gone down in history as Kaldor and Pasinetti's, or the post-Keynesian, theory of growth and distribution in the 1960s. Yet, it seems to us a certain number of theoretical post-Keynesian questions have remained unresolved. We shall give a brief, critical list below.

Alternative lines of research

According to Baranzini and Mirante (2013: 291-292), eight lines of research can be identified within post-Keynesian theory. We shall limit ourselves to mentioning them here, with a brief assessment. Effort and research is still in progress and feeds discussion concerning aspects of modern economic systems that still need in-depth studies.

Researchers introduced 'a differentiated interest rate on wealth' in post-Keynesian models. Yet there is no generally shared post-Keynesian theory of interest, but rather different opinions as to it. Furthermore, no theory of interest and profit has emerged that is able to refute relative neoclassical positions. Yet a true theory of interest

is needed. This must involve an analysis of profit and savings. Moreover, little or nothing of significance has been undertaken in the post-Keynesian ambit on the distinction, introduced by Wicksell, between natural interest rates (or profit rates) and market interest rates (1901 [1934], 1912 [1997], 1923).

Another line of research concerns the 'monetary sector'. Strange to say, money, a constituent part of modern economic systems, is often absent from post-Keynesian models. The theory of bank money (e.g., see Schmitt 1960, 1966 [1975], 1975, 1984; Graziani 1983, 1989, 1996, 2003; Lavoie 1996, 2003, 2006a, 2006b, 2013, 2014; Seccareccia 1996, 2003, 2005; Bellofiore 2005; Cencini 2005, 2015; Fontana and Realfonzo 2005; Fontana 2006; Rossi 2007, 2009), especially, is a subject of controversy. Surprisingly, input-output analyses undertaken by various economists belonging to the post-Keynesian school are based entirely on a physical conception of production and consumption, completely ignoring the existence of bank money in our economies. Sraffa (1960), much expert on Ricardian economic thought, is perhaps the most well known exponent of this tendency. Since his analysis is based on physical productive activity, he proposes a theoretical world in which all economic magnitudes are physical, including wages. Wages are measured in a theoretical 'standard commodity' and are therefore real in nature. Regarding this, Sraffa writes (1960: §31): '[i]n the Standard system the circumstances of the wage being paid in Standard commodity seems to draw its special significance from the fact that the residue left over for profits will itself be a quantity of Standard commodity and therefore similar in composition to the means of production'. Therefore, in input-output analysis, even profit has an exclusively real nature.

Many researchers have busied themselves with the role of the 'public sector' in creating economic value in modern economic systems. However, it is unclear how, and whether, public intervention has the power to create new wealth, rather than simply redistributing existing wealth. A great deal has yet to be done to clarify the matter.

Although Kaldor initially developed his analysis of wages and profit on the basis of income categories, Kaldor himself, and Pasinetti, later shifted attention onto the role

of the possible social classes to which incomes belong. With the passage of time, researchers have followed three additional lines of enquiry. First, the introduction of other presumed 'socioeconomic classes' in post-Keynesian models, besides those of workers and capitalists originally proposed. Second, the study of the 'long-term distribution of wealth and of the income share of the socioeconomic classes'. Third, the development of 'overlapping generation models' so as to study the intergenerational transmission of wealth among social classes. However, one observation should immediately be made. In economic theory, the distinction between social classes has been used various times by a number of authors. For example, there is famously the classical division of society into workers, capitalists and landowners. Post-Keynesian economists, among others (see, for example, Hicks 1965), have instead developed long-term models in which one class consumes and another accumulates capital. A division into classes or sectors of society favors the simplification and functioning of the steady-state models developed in the 1960s and 1970s particularly, in which variables must grow at the same rate; such distinctions can also prove useful in explaining economic parameters (see Baranzini 2001: 224; 226-227 on this). However, it is in fact reasonable to wonder whether 'the formation, persistence, and dispersion of socio-economic classes at large' (quoting Baranzini 2001: 228) do take place in modern reality: it is, perhaps, over-simplistic to suppose the existence, for example, of two whole classes that live respectively on dividends and wages alone. Above all, it still remains to be proven, both at a theoretical and empirical level, that certain elements exist that compete in forming such classes (see Baranzini 2001: 229 for a summary of such elements). The hypothesis that socio-economic classes exist in modern economies has been the subject of controversy between authors belonging to the same school of economic thought. On this theme one may consider, for example, the debate between Kaldor and Pasinetti. Pasinetti (1962) bases his analysis on two classes – workers and capitalists – and on political implications – for instance '[t]he case of a socialist system' (Pasinetti 1962: 277). Earlier, Kaldor (1956), following Keynes, had preferred to base his own analysis on the existence of different typologies of income, independently of the social roles of income-

owners. This question is very well known. In a letter addressed to Mauro Baranzini (Baranzini and Mirante 2013: 290), Nicholas Kaldor expresses his reservations with regard to abandoning a typology-based study of income in favor of a differentiation of income based on social classes: 'you seem to ignore the main criticism I made against Pasinetti, i.e. that he is thinking of "workers" and "capitalists" as persons and not of profits and wages as types of income'.

Although the analysis made by Keynes was of a macroeconomic type, aimed at studying the system as a whole, many subsequent authors have advanced the hypothesis that modern economic systems should be studied as the sum of activities and behavior of individual economic agents. A number of post-Keynesian researchers have thus followed the idea, neoclassical in tendency, that macroeconomics has microfoundations. Within post-Keynesian economics, '[t]he first principle of micro-foundations […] is that macroeconomics refers to the aggregation of the outcomes of individual action, and thus should not be logically inconsistent with the analysis of individual behaviour' (Dow 1996: 98). On the other hand, an alternative idea deserves equal consideration. Namely, all individual activity that does not impact on the economic value of national output can be considered microeconomic. If this possibility is taken into consideration, then even one single individual activity is macroeconomic in nature (and not microeconomic!) if it modifies the economic value of national output.

The analysis that follows is likely to shed light on the previous lines of enquiry.

III The analysis of profit: a new approach

We aim here to propose a monetary theory of production 'that is not at odds with itself (first criterion of truth) and that is not contradicted by reality (complementary criterion of truth)' (Schmitt 1998: 38, our translation). The aim is to meet Keynes's (1936 [1964]) attempt to push 'monetary theory back to becoming a theory of output as a whole' (*vi*) by studying money within 'the economic scheme in an essential and peculiar manner' (*vii*). We will argue that profit, at the macroeconomic level, is positive. More than this, it is simultaneously both physical and monetary.

The underlying theme is that the remuneration of production "factors" coincides with production costs or value. Income is equal to the (monetary) value of goods and services, arising from the payment of wages. Keynes (1930a [1971]) defines the concept of income very clearly: the British economist identifies income with the remuneration of wages paid to employed workers and with the remuneration of entrepreneurs. Accordingly, Keynes identifies income with wages paid to workers as a group, including entrepreneurs (see Moggridge 1971-1989: 45, XX). Keynes (1930a,b [1971], 1936 [1964]) argues that entrepreneurs' remuneration is a category of profit that is part of income.

> It is preferable to regard labour, including, of course, the personal services of the entrepreneur and his assistants, as the sole factor of production (Keynes 1936 [1964]: 213–14).

We will start the current analysis endorsing Keynes's view. The entrepreneur's remuneration belongs to the category of wages and, we argue, cannot be considered profit as company's income. Identifying wage-units as a unit of measure for product value (q.v. Keynes, 1936 [1964]: Chapter IV) is equal to defining the national product in money. There is a product-wages relationship where money functions as a unit of account for wages. Our ultimate goal in this chapter is to develop a discrete-time theory of output value, showing how company's profit forms and how investment activities are carried out in monetary economies.

Consider a closed economy where, for the first time, a monetary system is built up. In this economy only a single company, F, does exist. In the examples studied here, we will follow a periodic analysis, assuming that consumption goods are produced in period 1, whereas capital goods are produced in period 2. This is an assumption made here for didactical sake; nevertheless, the same reasoning will be applied also to a one-period setting as well as an infinite-periods one.

In this economy, initially (period one), goods and services of different types are produced by the company. Whenever we write here "goods" and "product", we also mean services, for 'goods and services are both examples of economic goods […]' (Solow 2012: 271). At the beginning of the first period, F obtains the opening of a line of credit by the bank, B, for the payment of wages to workers. For the sake of simplicity, suppose that only bank money is used. Neither coins nor banknotes exist. The people whose accounts are credited with wages ("wage-earners") include all kinds of workers, without any social class distinction: for instance, workmen, employees, managers, consultants, and so on. In this sense, workers may include shareholders of one or more companies, as well as entrepreneurs. Further, some individuals do not work: they either receive a share of wages from their families or expect to receive a share of future profits. When production is completed and the product is ready to be sold, workers' bank accounts are credited: this event triggers, so to speak, the formation of income, and *physical* output becomes *economic* output. The value of wage-goods is equal to wages paid in period one, W_1, which, let us suppose, amount to 100 money-units (m.u.).

'[W]ages are the sole production cost in a macroeconomic sense' (Schmitt 1998: 46, our translation). Borrowing Keynes's (1936 [1964]: 20) words, 'the income derived in the aggregate by all the elements in the community in a productive activity necessarily has a value exactly equal to the value of the output'.

Nominal wages distributed to workers as a whole guarantee, for workers, the power of purchasing all their products, since the cost of production is identical to the value of the product. The abandonment of the materialistic conception of money allows the creation of income to be understood: associated with the product, money is simultaneously 'negative' and 'positive', a company's debt and a credit of workers as a whole, both towards the banking system (Schmitt 1966: 286-287, our translation). The opposite holds true when income is spent. Since labor is necessarily the only factor of production, its remuneration, i.e. nominal wages, constitutes the monetary form of global income, and it confers workers with the right to purchase the whole real product.

A few examples may help clarify. Suppose that income-earners spend the totality of their wages in consuming produced wage-goods, that is $s_w = 0$. Two cases must be introduced. First, an 'economy with wage-income' only (Schmitt 1998: 42, our translation), that is, where no profit forms. Second, an 'economy where the final purchases are devoted to consumption or investment' (Schmitt 1998: 72, our translation), that is where profit is created and eventually invested in the production of capital-goods.

PRODUCTION, DEPOSITS, AND CONSUMPTION

If the selling price is equal to production costs, wage-earners always purchase the totality of wage-goods (they have themselves produced) by spending the totality of income at the end of period 1. No wage-goods are left in the company's warehouse. It is worth noting that consumption gives rise to the final expenditure of income.

The resulting accounting entries show this process (Table 3.1).

TABLE 3.1 *The payment of wages and consumption: bookkeeping*

Banks B			
Assets			*Liabilities*
(i) F	100 m.u.	W	100 m.u.
(ii) W	100 m.u.	F	100 m.u.
	0 m.u.		0 m.u.

(i) The payment of wages; (ii) consumption.
Source: *author's elaboration from Cencini and Rossi (2015).*

In this case, given that the selling price is equal to the cost of production, no profit forms.

Production and time

Traditional economic theories state that production is an activity that takes place over a continuous or discontinuous period of time. However, the traditional concept of eco-

nomic output completely gives way when shifting from a physical and chronological conception of productive activity to one that is economic and instantaneous. Let us follow the reasoning proposed by Schmitt (1984) and Cencini (2015).

Given production as an economic event, it would appear logical to study it not only in physical terms (that is, in terms of the result, the product as a new value in use), but also bearing in mind the role money plays in the production process. In other words, a measure should be found (and a unit of account) that renders labor homogeneous, just as for capital. Keynes (1936 [1964]) did a great deal of work in this direction by identifying wage-units as a measure of product value. Keynes went even further: he believed the only macroeconomic factor in production was labor, in stark contrast to the teachings of neoclassical theory. Research into wages as a measure of macroeconomic product value, together with the study of money as a numerical form of the product, carry the economic analysis of production into a new theoretical phase with practical relevance. What today is known as monetary circuit theory is based precisely on this two-fold concept of income as (net) credit that is both physical and monetary (numerical) in nature. 'Income *is* the real product, because it defines the unit both for money and its real content, and, at the same time, for the product and its monetary form' (Cencini 2015: 100, our translation). So far, however, this line of enquiry has not become widespread. Yet it seems logical to suppose that while physics remains subject to Lavoisier's Law, according to which all is transformed and nothing created, in economics, instead, the physical product acquires a new *form-utility*. Physical matter is in fact transformed into a real product (goods and services) that is useful to Man. Furthermore, this product cannot acquire the status of economic goods unless, besides being physical, it is also monetary. It is therefore reasonable to suppose that 'the product is born in monetary terms when, through the payment of wages, a numerical expression is attributed to its form-utility' (Cencini 2015: 101, our translation).

From a physical point of view, it is certainly true that, for productive activity to be undertaken, a period of time is necessary over which raw materials and energy are transformed. Yet, even when analyzed exclusively from a physical point of view,

economic production is in fact instantaneous, since matter and energy acquire a new utility-form at the precise moment in which the transformation process is completed (see Schmitt 1984). From an economic perspective, the product (goods and services) is considered to be such only from the moment in which it acquires a monetary form (that is, as soon as it is monetized). Economic production is instantaneous: that is, it takes place in the instant in which the physical product acquires a new utility-form through monetization (instant t^* in Figure 3.1).

FIGURE 3.1 *Production as an instantaneous event*
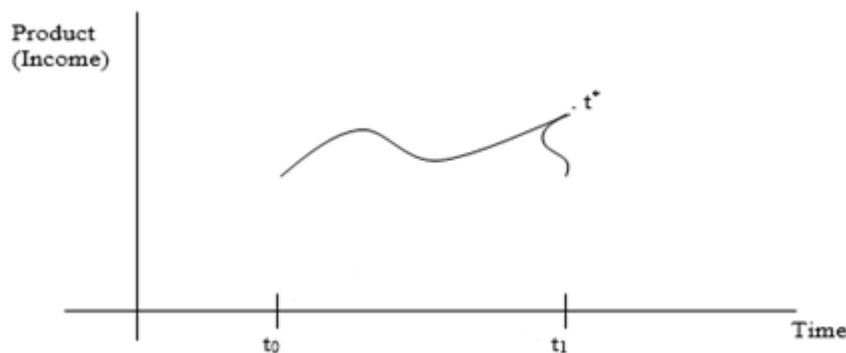
Source: *author's elaboration based on Cencini 2015: 105.*

Let us repeat it once more. Following Keynes (1936 [1964]), wages measure product value. This means that in the instant in which wages are paid, the product acquires the character of economic good: economic production, instantaneous, takes place thanks to the monetization of the product and "contains" the interval of chronological time needed for the production of the physical product.

> Although production is an instantaneous operation, and therefore lacks its own temporal dimension, it defines a quantum of positive time. […] Stating that production quantizes a segment of continuous (chronological) time means saying

that it emits continuous time in the form of an indivisible unit, a *quantum of time* (Cencini 2015: 105, our translation).

Now, if the product were monetized and demonetized instantaneously, this would be equivalent to the instantaneous production and consumption of income (a monetized product). Such a case would be a clear example of a relationship of identity between the production and consumption of an economic good, but it would be too strict to allow for banks' financial intermediation as well as for the development of a complex and articulated economy. Indeed, production and consumption usually take place in instants that are chronologically distinct.

Consumption and time

A study of consumption is a necessary stepping-off point to the understanding of macroeconomic or national profit. It will be argued, in fact, that, for profit to be distributed to companies' hands, consumption must take place: it is through wages expenditure that profit forms.

The analysis undertaken so far leads to the idea that economic theory must be differentiated from physical laws. It is reasonable to suppose that all human activity creates goods with a value-in-use for the individuals who benefit from them. However, it is just as reasonable to suppose that, when the amount of income is positive, the nature of goods is not exclusively physical, but *also* monetary. From this viewpoint, production is an activity that creates economic value only in the instant that it gives rise to an income associated with products and services.

A reasoning analogous to the preceding observations on production may be extended to consumption. If economists were to study physical consumption, they would replace physicists and would be forced to conclude that the term consumption – in the same way as the term production – is improper, since matter and energy are

transformed, being neither created nor destroyed. It is obviously true that, from certain points of view, economic consumption is linked to the product's physical dimension, since consumption, or the spending of income, occurs so as to obtain a benefit from the use of the physical object. Yet this latter observation should lead us to believe that economic consumption occurs only when there is sufficient income to purchase products and services. Pursuing this line of enquiry, economists should form the hypothesis that, consumption is the complementary part of production.

Thus the idea gains ground that 'producing means associating a physical product with a monetary form, creating a product-in-the-money' and that 'consuming, on the other hand, means "extracting" the real product from its monetary wrapper, thereby restoring it to the physical world as a value in use' (Cencini 2015: 115, our translation). Creation is foreign to natural phenomena, but economic production and consumption are, instead, events in which income is respectively created and destroyed. Consumption does not entail the destruction of matter and energy, but rather the destruction of income: therefore, it is income to be consumed, not the product. Moreover, consumption cannot take place without the prior formation of income. Thus, consumption cannot be understood unless it is identified as a complementary part of production.

In Figure 3.1 we have represented the creation of income as an instantaneous event. The physical product acquires an economic nature in the instant in which new income is created, that is, at the moment in which the product acquires a numerical form. The instant t_1, in which income is created, retraces the length of time needed to produce the physical product. Contrarily, 'consumption takes place in the precise instant in which the product abandons its monetary form to become a simple value in use. […] Consumption quantifies the same period of time previously quantified by production' (Cencini 2015: 116, our translation). Figure 3.2 represents consumption as an instantaneous event. In t_2, income is spent (consumed) in the purchase of the product. That precise instant retraces the time needed to undertake productive activity. In t_2, the economic product is destroyed, leaving its place once more to the physical product.

In production and consumption, two exchanges, called *absolute*, take place: the physical product is first transformed into income and, subsequently, the destruction of income enables the product to reacquire an exclusively physical form. 'Production and consumption are […] two complementary aspects of a single reality, although […] it is possible they are separated by a period of positive time. In fact, money offers the advantage of facilitating a chronological distinction between production and consumption, while not contradicting their simultaneousness' (Cencini 2015: 117, our translation).

FIGURE 3.2 *Consumption as an instantaneous event*
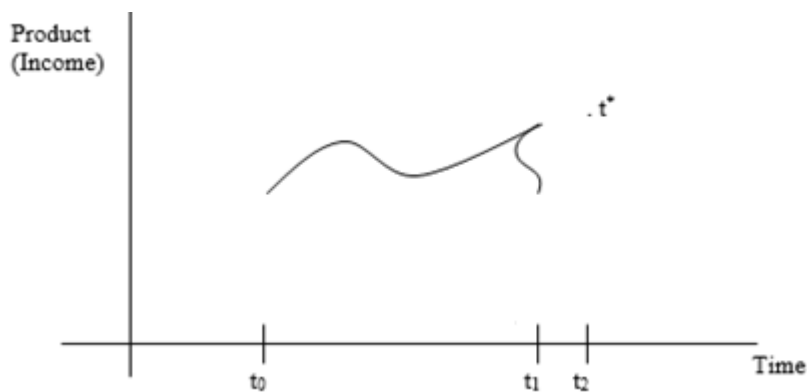
Source: *author's elaboration based on Cencini 2015: 105.*

Deposits

We have observed so far that the identification of the productive process with the transformation of raw materials into finished goods to be sold to households has until now induced economists to think that production takes place in chronological time, and that it is exclusively physical. The same is true of services. However, the theory presented here shows that the production of goods and services does not take place in

continuous time, but is 'defined in indivisible time' (Schmitt 1984: 37, our translation). It is indeed logical to assert that physical products are produced over chronological time. However, in the case of economic production, the reasoning is different. Production takes place in the instant workers are credited and the company is indebted as a result of the payment of wages. Production gives rise to an economic product, and it is an event that instantaneously retraces the chronological time necessary for the transformation of matter and energy into a new utility-form: *'the product is formed in quantized time'* (Schmitt 1984: 40, our translation). *'Thus, the product is a space-time and a space-number'* (Schmitt 1984: 40, our translation): in fact, besides creating a "space-time", production gives rise to a product that is also a numeraire, being 'money […] the condition sine qua non of the existence of the numeraire. The product-numeraire is the product-in-the-money, the product-money' (Schmitt 1984: 41, our translation), constituting the amount of bank deposits. At the moment salaries are paid, workers' current accounts are credited by the bank, and the company is debited towards the bank. Hence, an income is formed, given by the association of money and goods and services, which are the real side of productive activities: 'the union of the product-stock and the money-form defines the income' (Schmitt 1984: 105, our translation), or, to put it another way, 'monetary wages (S) comprise the entire national income (R). […] R=S' (Schmitt 1984: 121, our translation). Following Schmitt (1984: 95, our translation), wages are the result of 'labour-spending', not 'money-spending', as traditional theories state instead. Moreover, the payment of wages is an emission that permits the transformation 'of money-number into money-product' (Schmitt 1984: 97, our translation). That is, an absolute exchange of the product for itself.

However, monetary circuit theory states that, at the same time, income is transformed automatically, giving place to a monetary capital – called 'financial with redundance' (Schmitt 1984: 173, our translation) – at the disposal of banks. Such capital is called capital-time because it is temporary, an income that is 'outstanding', as it is a 'future income of households' (Schmitt 1984: 173, our translation): 'all current income that will be found in a future instant exists meanwhile under another identity, precisely

that of *capital*' (Schmitt 1984: 173, our translation). Now, it must be observed that 'no holder has the time to spend his income at the instant it is formed; every holder in this way saves his income until the moment (chosen by him) when he spends it on the goods market. Saving is not an income, but a capital' (Schmitt 1984: 173, our translation). Income holders hence constitute a credit toward the bank. This credit represents the households' right over a real capital stocked within the company. The financial capital is the credit title of workers toward the material capital deposited within the company (the debt of which is registered as a bank's asset). When savings are then spent, capital-time is destroyed and transformed into an income, which is finally spent on the market goods. The 'product is withdrawn from the stocks; correlatively, the credit of house-holds towards the banks are destroyed' (Schmitt 1984: 174, our translation).

This conception of the product is represented in Figure 3.3, which represents the situation described in Table 3.1. The amount of deposits is represented by money "full" of its real content, the product. At instant t_0 and at instant t_1 income is formed and destroyed respectively. Within the time elapsing between t_0 and t_1 the amount of depos-its constitutes a capital defined by Schmitt as "capital-time". This concept is developed hereinafter. Capital-time is the amount of deposits existing in the instant following and preceding the formation and the destruction of income respectively. In the following example, for the sake of simplicity, we suppose that income is fully destroyed at instant t_1.

FIGURE 3.3 *Bank deposits*
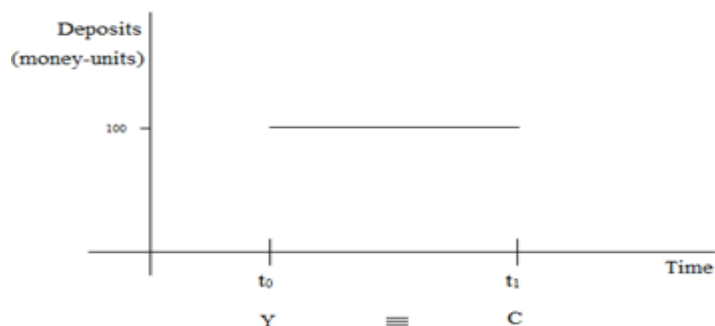
Deposits represent the temporary capital that exists between the moment in which income is created (the payment of wages) and the moment in which income is definitively spent. Double-entry bookkeeping, in modern banking systems, allows income to be continually created and spent. Therefore, in any given moment of time, the level of deposits depends on the total sum of previously created incomes that have not yet been spent. This observation is of great importance both theoretically and in practice. In fact, an analysis of bank deposits, namely, of the evolution of national income, shows a different dynamic to that foreseen by traditional economic theory. Instead of following a theoretical growth path in continuous time, modern economies behave according to a dynamic of an instant-like type. Figure 3.4 shows different levels of deposit in an economy in which three wages payments have occurred, in t_1, t_2 and t_3, following three different productive activities. Figure 3.4 shows that income paid in t_1 is definitively spent in t_4; wages paid in t_2 are spent in t_6, while those paid in t_3 are spent in t_5. The income level over a given period depends on the total sum of global deposits during that precise period of time. For example, the level of deposits between t_3 (included) and t_4 (excluded) are equal to temporary capital (global deposits) that amount to $Y_1 + Y_2 + Y_3$, where Y_n is the value of the product created by the *n-th* productive activity.

FIGURE 3.4 *Instant-like dynamics*
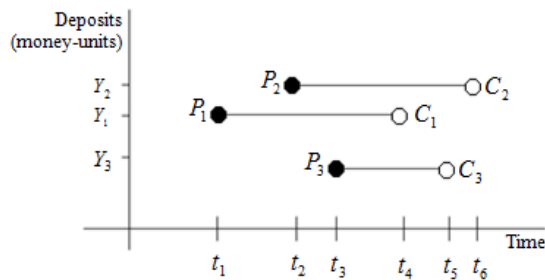
If, for instance, total income amounts to x money-units and households spend x-y money-units in purchasing goods and services, the amount of bank deposits after the purchase equals y money-units: firms debited on the asset side of banks' balance sheets (y units), while households (workers or income earners) are credited for the same amount on the liabilities side of the balance sheets (see Rossi 2003: 345). Then, the remaining income of y money-units will be definitively spent when the product is totally sold by firms to households.

A clarification can be useful in order to understand the role of money in monetary economies. Money is studied as an instantaneous flow giving rise to a monetary stock. On the one hand, in fact, money is used as a payment tool in every single transaction, i.e. the payment of wages (production) and their definitive expenditure (consumption). For instance, a bookkeeping entry for wage payments in the banking system is instantaneous, and it implies the debit-credit of every single agent. The final expenditure of wages is an operation in which money is again used (and instantaneously destroyed) as a vehicle. In the former case, income is created; in the latter case, income is definitively spent, since the relationship credits-debits between workers and the company is definitively extinguished. Between the payment of wages and their final expenditure a double stock does exist: namely, a stock of real goods, and a stock of financial securities corresponding to the amount of bank deposits created thanks to production, where each represents one face of a unique (double-faced) reality. The payment of wages is thus an operation that involves money in a monetary flow implying two debit-credit relationships for the company and workers. The pay-off of this relationship is instead the effect of the final expenditure of income. What exists within the two payments is a stock whose nature is both real and monetary, which can be redistributed among workers and companies, giving rise, for instance, to profit. The 'causality runs from money as a flow (means of payment) – the *primum mobile* – to bank deposits (stock of wealth)' (Rossi 2003: 345).

As soon as money "covers" the physical product, a numerical form has been given to real output. Since this event takes place *instantaneously*, economic production

acquires specific attributes. Independently of the time spent to carry out a physical productive process, production is economic whenever goods and services are monetized: goods and services are monetized thanks to the sole union of money and output. When wages are paid, an emission of a *quantum* of time takes place: economic production instantaneously *quantizes*, backwards and forwards, the chronological time necessary for real output to be physically completed. 'Thus, to emit the time period t_0–t_1 as a *quantum* means to carry out an operation that, in an instant only, allows the retracing of t_0–t_1 in a wave-like movement of flux-reflux' (Cencini 2015: 105, our translation). An absolute or monetary value of output originates hence when wages are (instantly) paid.

What has been observed so far about production is equally true of consumption. In fact, bank bookkeeping leaves no room for misunderstanding: consumption *instantaneously* takes place when income is definitely spent. It is not goods or services to be consumed, but income. As soon as the company covers its production costs (or, at least, a part of them, following clients' purchase of goods and services), wages (amounting to the product's value) are paid back to the company. Hence, income is definitely spent, this meaning that the overall deposits level has changed (in particular, assuming that no further wages payments have been made, the deposits level has decreased). When the final expenditure of income takes place, the product loses its monetary form, i.e. it is instantaneously de-monetized: once national output has been deprived of its absolute or monetary value, only a value-in-use is left into the real world. At consumption, an emission of time takes place: period t_0–t_1, is *quantized*, as in the case of wages payment, in an instant of time.

Production gives rise instantaneously to new income. On the contrary, definitive consumption implicates income final expenditure. Between production and consumption, a temporary capital survives, the nature of which is twofold, being it monetarily deposited in the bank system and physically stocked in the company. 'Consumption, as well as production, implies a twofold operation of purchase-sale carried out by workers (or by someone else on their behalf) and by companies. The payment of wages defines, from the workers viewpoint, the purchase of financial securities (bank deposits) and the

sale of services, while consumption defines the sale of bank deposits securities and the purchase of produced goods. From the perspective of companies, instead, the sale of the goods stock, which had been formed following the initial investment of wage income lent by workers, goes with the purchase of debt securities previously transferred to banks' (Cencini 2015: 145, our translation). Both instants of time, when economic production and consumption take place, retrace the continuous time over which real production has been carried out. Although one is the other's opposite, production and consumption are the two faces of the same reality. Quantum time 'allows for the respect of the necessary coincidence between production and consumption […]. The initial financial purchase of the product, defined by the transformation of income into capital, is followed by its final purchase, defined by the inverse transformation of capital into income. In conclusion, capital-time reconciles the […] simultaneity of production and consumption with their chronological separation' (Cencini 2015: 145, our translation).

We can now carry out the analysis of profit. We shall argue that national profit plays a key role in the study of economic activity. We shall investigate whether profit and wages are to be placed at the same conceptual level between each other, in an additive way, or whether, instead, it is possible to identify a distributive process that leads to the formation of profit, beginning with wages. We shall then study investment activity from both positive and normative perspectives.

NATIONAL PROFIT

Now, one question is straightforward: if nominal wages represent the monetary side of the domestic product, does it follow that profits are null, as affirmed by the neoclassical theory? The active-passive nature of bank money leads to an understanding of the physical formation and monetary realization of profit. We will argue that without spending, there would be no profit creation and, therefore, companies would produce neither consumption nor capital goods. Classical economists had already discussed this topic. Malthus, for instance, states 'the principles of saving, pushed to excess, would destroy the motive to production' (Malthus's letter to Ricardo, dated July 7, 1821, cited in Keynes, 1936 [1964]: 363). We aim here at establishing whether it is possible for families to spend their income in a sum equal to their wages and, at the same time, voluntarily give up part of their consumption to favor the redistribution of part of their current income to companies, under the guise of profit.

Before developing research in this direction, it must be observed that economists at large traditionally focus on the role of households' savings, rather than profit, in determining investment. But if the previous statement, according to which savings can exist even when families have completely consumed their own income, is deemed plausible, then investment would not be determined by households' savings but rather by a different saving typology. The identity linking such kind of saving and investment would represent a true identity and there should therefore be space for the possibility that investment levels are determined by total profit (see Schmitt 1966, 1984; Cencini 2005, 2015; Rossi 2007).

We shall develop the following example. Let us suppose we are employed in a factory and that we are paid for producing ten computers. For the period computers are not sold, they remain in the company's warehouse and they are associated with the wages paid to us. Wages are our credit and they represent the company's debit. This credit-debit is toward the bank, which makes the payments of wages whenever asked for by company's managers. Supposing computers are sold at their production cost (i.e. if

nominal wages are 100 m.u., the individual price of computers is 10 m.u.), then, when we spend wages in purchasing computers, the credit-debit relationship no longer exists: in fact, we get the physical product (computers) at the very instant we spend wages; at the same time, the company extinguishes its debit toward the bank by selling the physical product. Let us analyze this example in detail. From a logical point of view, we produce computers. The bank acts as an intermediary between the company and us: being the company registered at the asset side of the bank, produced computers are financially deposited within the bank. The deposit represents a company's debt towards the bank. The bank liability represents a credit in our favor – whose object, or real content, is produced computers. No profit has been made. But things do change as soon as we relax the hypothesis of a selling price equal to the cost of production.

Now, consider the case in which computers are sold at a price higher than their production cost (let us suppose, for instance, that nominal wages are 100 m.u. and that each computer is sold at 12.5 m.u., meaning that the selling price of total output is 125 m.u.). This, we will see, is the condition *sine qua non* for profit to form. By spending our entire income, we cannot purchase the entire stock of computers, but just a share of it. *Monetary wages corresponding to the production cost of purchased computers (80 m.u.) is spent forever. Remaining monetary wages, which correspond to the production cost of computers still unsold (20 m.u.), are distributed as company's profit.* Initial monetary income is thus partially destroyed and partially distributed to the company. A share of real product is purchased by ourselves; the remaining part is still stocked within the company. Profit's nature, hence, is twofold, both monetary and real.

The firm sells a percentage of production and stocks the remaining part. That is to say, F makes a profit: '[t]he profits formed at p_0 [period 1 in our case] are […] the monetary aspect of the circulating capital corresponding to this real stock of consumption goods' that remains unsold (Cencini 2005: 140). Although the monetary incomes of society as a whole, i.e, wages, are the monetary side of the domestic product, it does not prevent companies from making a profit. Also, this does not even prevent, for example, capitalists from receiving their own income as capital remuneration, or interest. For

simplicity's sake, since capital does not yet exist, let us assume in any case that interest is null. As put by Schmitt (1966: 288, our translation), in order for profits to be positive, '[it is] *enough* [...] *for companies to be able to circulate products at prices higher than the wages distributed'*.

The following example will clarify the points at issue. Consider the wages paid at the end of the first period, W_1 = 100 m.u., a selling price p = 125 m.u., the value of sold production equal to 80 m.u., and the profit equal to 20 m.u. This case is represented in Table 3.2. We call: W_1 the total wages; p the selling price; α the ratio W_1 / p; π the rate of profit of this economy (where $\pi = 1\text{-}\alpha$); and P_1 total profits.

TABLE 3.2 *Wages and profit (all values in monetary units)*

Wages, W_1	Selling price, p	Rate of sold goods, α	Value of sold goods	Rate of profit, π	Profit P_1
100	125	0.8	80	0.2	20

Table 3.3 shows the bookkeeping representation of this case, from wage payment to profit creation.

TABLE 3.3 *Profit creation: bookkeeping*

Banks B			
Assets			*Liabilities*
(i) F	100 m.u.	W	100 m.u.
(ii) W	100 m.u.	F (profit) + F (product)	20 + 80 m.u.
F (product)	20 m.u.	F (profit)	20 m.u.

(i) The payment of wages; (ii) consumption and profit.

Source: *author's elaboration from Cencini and Rossi (2015).*

The most relevant consequence of profit formation on economic theory is highly important: profit, a corporate income, is formed as a real stock and as a bank deposit. Thus, profit theory must be carried out as a unitary analysis of real and monetary profits. The observation of real transactions on labor and product markets does not, in fact, leave room for any doubt: profits are a company income of substitution, and, as such, they can be positive. Whenever a payment of M money units arises from the production of a product, which is priced at xM, the expenditure of xM is twofold in nature. The expenditure is in fact a partial destruction of income, since a share of the product goes from the company to the workers; 'for the remaining part […], it is a redistribution of monetary income, which is transferred by buyers to the productive company', within which the other part of the product remains stocked (see Schmitt 1966: 288, our translation). It is therefore evident that, given the wage level, the higher the price of the domestic product, the higher the quantity of goods that, at the end of the initial period, will be stocked within the company. This fact is important: wages and profits are not complementary to each other; i.e. profits are not in an additive or residual relationship with wages. Profits are an income that is captured by companies. 'In fact, they are included in distributed wages. One can see that the greatest simplicity is achieved: a single type of production income does exist, a "simple" type, nominal wages, where all other incomes are comprised' (Schmitt 1966: 282, our translation). It follows that real wages received by workers are a share of nominal wages constituting the totality of national income (*ibid.*).

The payment of wages is therefore an event where the product is exchanged for itself. The exchange is called absolute. Wage earners maintain ownership of the product despite it being physically stocked within the company. When workers will spend their wage income, it will be destroyed. The product stocked within companies will be null. Smith had already grasped that '[i]n that original state of things, which precedes […] the accumulation of stock, the whole produce of labour belongs to the labourer' (Smith 1776 [1981]: 92). Borrowing Marx's words (1867 [1982]: 643), '[t]he product is trans-

formed from the direct product of the individual producer into a social product, the joint product of a collective labourer'.

However, at least a clarification is required. We must consider, on the one hand, the initial stock (corresponding to the whole product stocked within the company) and, on the other, the stock appropriated by the company following the creation of profit. Once profit has been formed, overall bank deposits amount to 20 m.u; in fact, out of initial 100 m.u. of income, 80 m.u. have been destroyed or definitively consumed. This means that a stock valued at 80 m.u. has been finally purchased by income-holders. The remaining stock, whose value amounts to 20 m.u., still remains to be purchased. Thanks to the payment of wages, income earners are, and remain, the owners of the product in terms of wages; however, in terms of capital, the product belongs to companies, which are free to sell the product at whatever price they wish.

Now, two observations must be made. The exchange law of equivalents seems to be contradicted by facts, i.e. by the divergence between output value and its selling price. Yet, as it will be observed shortly, a careful analysis will show that profit is formed in full respect of the equality between value and price. Further, some remarks must be added on income expenditure: in fact, profit formation implies the destruction of a fraction of wage income and the distribution of the remaining part.

It is quantum time that allows a thorough study of production, consumption, and profit formation. 'Production and consumption are the complementary and simultaneous phases (in quantum time) of a single event, and, as such, they contribute to the determination of output and its subdivision into wage-goods and profit-goods' (Cencini 2015: 124, our translation). Once income-earners spend the totality of wages, the divergence between prices and costs (values) occurs only in chronological time. Let us analyze this issue. The expenditure of 100 m.u., in the previous example, leads to the formation of a profit worth 20 m.u. Bank double-entry bookkeeping is such that, out of total wage income, 80 m.u. are definitively destroyed; 20 m.u. constitutes, instead, company's income. Let us write it once again: the nature of profit is twofold, being it physically stocked in the company and monetarily deposited in the bank system. Consumption and

production being the two faces of the same reality, as soon as they are studied as instan-
taneous events retracing physical production (continuous) time, one discovers that
output subdivision between wage- and profit- goods is already detectable when wages
are paid: *when wages are spent, profit is formed; when wages are paid, profit is spent*
(Schmitt 1984: 479). The initial payment of wages for 100 m.u. is constituted by the
formation of 80 m.u. wage-income and the expenditure of 20 profit-income. Hence, the
identity between consumption and production teaches that profit forms on the goods
market, and it is spent on the labor market.

Studied as an instantaneous event, profit formation takes place in accordance
with the exchange law of equivalents. When income-earners are initially paid, their
income actually amounts to 80 m.u; such an income will be spent then to purchase
goods valued at 80 m.u. The price of purchased wage-goods is thus equal to their value.
On the other hand, the company's expenditure of profit takes place in the initial pay-
ment of wages, when company's income is spent; the formation of profit takes place on
the product market, when income is spent by income-earners. Profit expenditure as well
takes place in full accordance with the equality between values (20 m.u.) and prices (20
m.u.). 'The difference between prices and values, verified over chronological time, is
fully absorbed in the analysis […] imposed by the monetary nature of production and
consumption. The quantum simultaneity of these two operations leads to a re-
interpretation of wages emission, in which profit expenditure is included' (Cencini
2015: 125, our translation).

Profit distribution and lending

Let us suppose that profit is formed in company's hands. From the initial stage, in
which the entire monetary income corresponded to wages, the macroeconomic situation
evolves to a new stage, in which it is in company's hand. Our point is: can the distribu-

tion of profits possibly generate an increase in demand compared to the offer, and, therefore, a situation we define as inflationary?

For as long as they are not distributed or invested in a production of capital goods, profits remain deposited in a bank account belonging to the company. Once profits have been distributed (for example, to shareholders, or in charity, or to households through the intervention of the fiscal authority), they are instead placed into bank accounts belonging to the various beneficiaries. The ownership of the accounts in which profits are credited makes no difference to the system functionality as such: once formed, profit is company's income or, for instance, dividends available (currently or in the future) to shareholders. Thus, the legal ownership of profit does not appear to affect the nature of the economy as a whole, in which, in either case, a distribution of profit takes place, whether to one player or another. It would appear logical that no alteration in monetary levels occurs, following the distribution (current or future) of profits.

Now, let us suppose that profits, formed in the company's current account, are neither spent in acquiring consumer goods, nor invested in new productive activity. Let us also suppose, for simplicity's sake, that no new deposits are created. If the bank were to lend these profits to whoever requested a loan for consumer purposes (and banks have the power to do this, provided profits distributed to shareholders are not spent definitively), this would be equal to a new distribution of income. Following this redistribution, the total sum for income would remain unchanged: what would change would be the sharing out of income, that is, how it is shared among those entitled to income.

If this were the case, no economic disorder would have reason to arise. However, the analysis would not be concluded. Borrowers would be debtors with regard to the bank (or better, in the final analysis, with regard to families) for a sum equivalent to lent profits. Borrowers would be able to extinguish their debt only by using future income. This consideration is microeconomic in nature: namely, independently of legal ties between creditors (the bank, on behalf of deposit owners) and debtors (borrowers), in the case under study the amount of income remains unvaried compared to its initial level. The conclusion is simple: resorting to a loan from company's profits – although

there is no reason to reach a different conclusion in the case of a loan from family savings – would appear to be equivalent to the distribution of company's savings – with a current advantage for borrowers for a sum equal to the loan granted. This would be equivalent to a current *surrender*, by companies, of part of their income, with the aim of recovering it in the future – usually with added interest.

Thus inflation is apparently due neither to the existence of profit, nor to loans from the deposits that define them. Much the same could be said when banks lend individuals' savings to the general public. Company's profits are (derived from) wages and, if profits were the cause of inflation, wages would also be inflationary. Banks lend all income deposited with them, regardless of the identity of account holders, without such operations provoking any economic disorder.

National or macroeconomic profit: examples

Up till now, we have studied the process of profit formation over a short time lapse and by considering a single company *F*. The study is easily understood if we consider the case in which an economic system is created. However, the analysis is not limited to such a case and may be applied to all real world examples in which several companies interact among themselves. Rather than attempt to describe all of them – an obviously impossible task –, some examples might serve to comprehend the matter. They might especially help in understanding the distinctions between the macroeconomic and the microeconomic dimensions. Despite the simplicity of the following examples, infinite, more complex, examples could be studied as desired. Nevertheless, the reasoning remains the same in all scenarios. Their lesson is therefore universal. This highlights the fact that the analysis in question, valid in the case of a single company, also holds true for a multi-company scenario, and, above all, it includes the entire set of companies existing in the same monetary system: in this context, therefore, the object of inquiry for the political economist is the industrial system taken as a whole.

The physical production of each company acquires economic attributes at the very instant wages are paid. Following Schmitt's reasoning, each single economic production is a macroeconomic magnitude, due to the fact that it increases national income each time it takes place. 'Wages payment (the only macroeconomic cost of production) […] is the only [payment] through which physical goods become the object of a bank deposit. Whereas all other payments imply income expenditure, the payment of wages causes the formation of a positive income that is the result of the union of money and output, and thanks to which the physical product is the object of wages deposited as banks' liabilities' (Cencini 2015: 101, our translation). 'As soon as production outcome is not conceived of just as a physical object, but as the union between the physical product and its numerical-monetary form (as product-in-the-money), it becomes clear that the whole product is a *net product*. […] [P]roduction is a *macroeconomic* event, since it increases the income of those who carry out it, and also the income of the whole economic system to which they belong' (Cencini 2015: 103, our translation).

Example 1

Let us therefore suppose an economy where a number of companies do exist, each company being specialized in a specific industrial sector. Companies are specialized in food, clothing, real estate, automobiles, services, and other goods (Table 3.4).

TABLE 3.4 *Wages in a multi-company economy*

	Wages
Food	800,000
Clothing	50,000

Real estate	100,000
Automobiles	20,000
Services	16,000
Other	14,000
Total	1,000,000

Supposing that households (income earners) spend all their income in the purchase of food, the food company makes a profit of 200,000 money-units. In fact, the food company's earnings amount to 1 million money-units, while wage-costs total 0.8 million money-units. All other companies, instead, face costs for 0.2 million monetary-units, and have no gain. Still, an observation shall be made. As soon as the food company's earning is distributed to shareholders, it can be spent in purchasing the goods produced by the other companies. If clothes, houses, cars and services are sold at their production cost, shareholders will purchase the whole produced stock. Companies entirely cover their productions costs (wages).

From a macroeconomic viewpoint, total wages amount to 1 million money-units, which is the production cost of all companies, *taken as a whole*. Namely, this is the cost of production of the representative or macroeconomic company that would exist if we were to consider all companies as individual branches of a unique firm. The profit made by the food company is also arrived at by setting a selling price of 1.25 million money-units over production costs of 1 million money-units. A proportion may be of help:

$$800{,}000 \text{ m.u.} : 1{,}000{,}000 \text{ m.u.} = 1{,}000{,}000 \text{ m.u.} : x \text{ m.u.}$$

Hence, x (the selling price) equals 1,250,000 m.u.

Example 2

Now, another example might help make things even clearer. Suppose that income-earners spend the totality of their wages. Also, suppose that companies sell a percentage

of production and stock the remaining part, this meaning that companies make profits. The rate of profit for each company differs from the rates of profit for the others, this meaning that the macroeconomic or selling price of the entire product cannot be found as the sum of each company's selling prices. This study case is summed up in Table 3.5. By using the data in the first two columns, total profit can be calculated as the sum of each company's profits.

TABLE 3.5 *Wages, prices, and profit in a multi-company economy*

	Wages	Selling price	Share of sold goods	Value of sold goods	Rate of profit	Profit
Food	50,000	60,000	0.83	41,666.67	0.17	8,333.33
Clothing	120,000	185,000	0.65	77,837.84	0.35	42,162.16
Real estate	500,000	580,000	0.86	431,034.48	0.14	68,965.52
Automobiles	40,000	60,000	0.67	26,666.67	0.33	13,333.33
Services	30,000	45,000	0.67	20,000.00	0.33	10,000
Other	260,000	320,000	0.81	211,250.00	0.19	48,750
Total	1,000,000			808,455.65		191,544.35

It should be evident now that

> macroeconomic magnitudes […] are not obtained by aggregation; they are *sets* in the mathematical sense. Each product, however "small", is a set; the product of every individual is macroeconomic, the sum of products gives a macroeconomic result quite simply because each product is already a macroeconomic magnitude. This means that the product is the result of a *net* creation […]. Each product thus increases the wealth of *society as a whole*, even if it appears in the possession of a single individual (Schmitt 1986: 129).

Given global wages and companies' incomes, the economy profit rate, π, approximately amounts to 0.19. If we were to conceive companies' products (food, clothes, real estates, automobiles and so on) as the products of a single firm, the macroeconomic or selling price of the whole product would amount to 1,236,926.23 m.u., as given by the following formula: $p = \dfrac{\sum W}{1 - \pi}$.

INVESTMENT

Once formed, arising from the distribution of wage income from workers to companies, profit can be distributed (to physical individuals) or invested by the company. We postpone an analysis of distribution. Meanwhile, we study profit investment. Marx had already grasped that, once it has been understood how profit arises, it is necessary to understand how capital is formed from profit: '[e]arlier', Marx writes (1867 [1982]: 725, I), 'we considered how surplus-value arises […]; now we have to see how capital arises from surplus-value. The employment of surplus-value as capital, […], is called accumulation of capital'. Whereas Marx believed that profit arises from the labor-force, here it has been argued it is formed out of wages.

Now, suppose that, subsequently (period 2), the managing board of the company, *F*, invests its profits in the production of capital-goods, and that, through the spending of profit, *F* finances the new payment of wages. Notice that neither a new line of credit nor the use of company's borrowings from the bank is necessary in order to produce, in the second period, capital-goods. Moreover, suppose that workers (wage-earners) spend the new wages in the consumption of wage-goods that were stocked in *F* at the end of the first period. If we suppose for the sake of exposition a selling price equal to the value of production of wage-goods (that is, at a price of 20 m.u.), no new profit is generated, and income is fully spent. Following consumption, bank deposits turn out to be null.

This fact is corroborated by double-entry bookkeeping: no income survives in banking accounts. The bookkeeping representation of this situation is shown in Table 3.6. We will get back to this issue later on, arguing that something odd is taking place during this phase.

TABLE 3.6 *Investment: bookkeeping*

		Banks B	
Assets			*Liabilities*
(i) F (profit)	20 m.u.	W	20 m.u.
(ii) W	20 m.u.	F (product)	20 m.u.
	0 m.u.		0 m.u.

(i) Investment; (ii) the purchase of unsold goods.

Source: *author's elaboration from Cencini and Rossi (2015).*

In this case, and contrary to the previous one, the investment of profit gives rise to what Schmitt calls macroeconomic investment or national saving. Nevertheless, notice that not a trace of it is left in bank accounts.

The effect of profit investment in a new production is the formation of a net fixed capital. The consequences on the theory of capital accumulation are far-reaching. According to Smith, accumulation consists in the accumulation of a capital that is necessary for production of consumption goods to be carried out. According to Marx, capital formation is an "original" accumulation, preceding capitalistic accumulation, a kind of capital accumulation that is not the result, but rather the starting point of productive activity. From the viewpoint of the theory of profit developed here, instead, capital formation does not precede the productive process, but is its result. We must observe that the *sine qua non* condition of capital formation is the production of consumption goods.

Now, the case of a null saving rate from wages and of a saving rate from profit equal to unity, as the one described above, was also contemplated by Marx in 1867 and Kalecki in 1935. Marx writes indeed: '[w]e leave out of account here the portion of the

surplus-value consumed by the capitalist' (Marx 1867 [1982]: 728, I). A question arises immediately: what can be said of consumption and investment when saving rates from wages and from profit are respectively other than zero and unity? The reader shall remember that this topic is also the object, for instance, of Kaldor's investigation in his 1956 formalization of Keynes's 1936 *General Theory*.

In the next section we sketch a simple example of the formation of capital. We study the process of profit creation, and its investment (complete or partial) in the production of capital-goods. We call s_w the saving rate from wages, and s_p the saving rate from profit. Their numerical values will be given arbitrarily.

Investment: null individuals' saving

Suppose $s_w = 0$ and $s_p = 1$. At the end of the first period, being W_1 the wages paid starting from a line of credit (100 m.u. in our example), and given the selling price, p (here assumed to be equal to 125 m.u.), economic output (the value of sold and unsold wage-goods) can be written as:

$$Y_1 = W_1 \alpha + P_1$$

In other words, economic output produced in the first period is equal to the sum of real wages, $W_1 \alpha$ (that is, the value of wage-goods that can be purchased by wage-earners given initial wages and selling price) and real profit (equal to the value of wage-goods that remain unsold at the end of the first period). Arguably, profit is not to be added to nominal wages, since it derives from them: profit is a share of wages distributed and then spent in the final purchase of goods or in the investment for the production of capital-goods. In other words, $Y_1 = W_1$, which means that nominal wages define both real output and nominal output.

Now, total output (of the first and the second periods), Y_2, is equal to the sum of the value of wage-goods produced in period 1 and the value of capital-goods produced in period 2, namely the sum of wages paid at the end of period 1 and wages paid at the end of period 2:

$$Y_2 = (1 + \pi)W_1$$

Output at the end of the second period is equal to nominal wages paid at the end of the first period, W_1, multiplied by $(1 + \pi)$, where π is the rate of profit of the economy (given wages and prices).

The total expenditure of wages (100 m.u.) leads to the formation of a profit of 20 money-units: income earners purchase 80% of the product, worth 80 m.u., and the remaining 20% is left stocked within the company. Profit has a twofold nature, both real and monetary, since it remains physically stocked within the company, but is also entered into the accounting books of the banking system. Moreover, profit investment, i.e. the expenditure of profit in the payment of wages in the second period, instantaneously creates capital goods worth 20 m.u.

It should be noted that the expenditure of the totality of income can take place at different moments, but it does not change the final result. In fact, supposing the entire production of the first period has been sold at the same ratio value / price, once the totality of income has been spent, a profit of 20 m.u. will form and will be invested: the value of wage goods will be 100 m.u. and the value of capital goods will be equal to 20 m.u. The introduction, in the theoretical discourse, of households' saving complicates the matter, although the final outcome remains unchanged. Hicks's words in his *Capital and Growth* might be borrowed:

> I do not mean to imply that 'saving out of wages' is practically unimportant.
> But the complications which it introduces are not matters of principle; they ob-

scure our vision if we insist on taking them into account all the time (Hicks 1965: 146).

However, the study of savings from wages and from profit might help understand better the theory at hand. The analysis cannot be relegated to the case of a saving rate from wages equal to zero and a saving rate from profit equal to one. We will extend our analysis to another case. We will ask in fact what happens when income is spent only partially over a period, giving rise to a profit that is then invested in a production of capital goods. In this analysis we will introduce the hypothesis that at the end of the second period bank deposits are entirely spent in the purchase of the unsold goods of the first period. We also introduce the realistic hypothesis that a share of profit is distributed to shareholders.

Investment: positive individuals' saving

Suppose that $s_w = 0.3$ and $s_p = 0.6$. This is the most complex case among those to be studied. Therefore, formulas and conclusions on this case hold true also for all the others.

Assume the same data of the first case relative to wages (100 m.u.) and total selling price (125 m.u.). If $s_w = 30\%$, workers spend 70 m.u. (being their saving, S_w, equal to 30 m.u.). Therefore, they purchase 70/125 of wages, i.e. wage-goods worth 56 m.u., but priced 70 m.u. The firm, F, gains a profit of 14 m.u. If $s_p = 0.6$, at the end of the second period capital-goods produced have a value of 8.4 m.u. (to wit, 60 per cent of profit), and the remaining 5.4 m.u. (40 per cent of profit) are distributed as dividends.

As in the first case, the value of output produced in the first period is equal to the wages paid in the first period. Let us think on the analysis over two-time periods carried out so far. Following a productive process, initially all goods and services are wage

goods. This is tantamount to asserting that output value is equal to wages paid for the production of the entire product. Since companies aim at profiting from selling produced goods to income-earners, output value can be studied as the value of sold goods plus the value of those goods that are left unsold at the end of the first period. An example may be of help in understanding. Let us get back to the numerical example in which 100 money-units (m.u.) are paid as wages. Given a selling price of 125 money-units, income expenditure leads to the destruction of deposits amounting to 80 m.u. and to the formation of a company's profit equal to 20 m.u. This means that, retroactively, the value of produced goods was made up of (i) those goods (for 80 m.u.) that have been sold and by (ii) those goods left unsold at the end of the period (the value of which is equal to 20 m.u.). For the sake of simplicity, suppose that profit is distributed to shareholders, who spend dividends in the final purchase of the unsold stock of goods. In this case, income has been fully destroyed (deposits being nullified). Now, we shall investigate the composition of output value when wage-earners spend only a fraction of (100 m.u.-)wages paid at the beginning of the first period.

Consider the case where the saving rate of wages is positive (for instance, equal to 0.3). We compute output at the end of the first period as the value of sold and unsold goods. Our reasoning leads us to compute economic output as the sum of: (a) the value of wage-goods sold; (b) the value of wage-goods unsold owing to the saving of wages (these goods could have been sold if workers had spent the totality of wages paid to them); (c) profit formed by the positive difference between selling price and the value of production (it is not known yet whether this profit will be invested or not in the production of capital-goods); and (d) profit unformed owing to the saving rate of wages (profit that would have been formed if workers had also spent that share of wages that they have saved):

$$Y_1 = c_w \alpha W_1 + s_w \alpha W_1 + c_w \pi W_1 + s_w \pi W_1$$

The sum of what we defined as the value of wage-goods unsold owing to the saving of wages and profit unformed owing to the saving rate of wages is workers' saving of wages (in our general case, 30 m.u.). Observe also that (a) + (b) equals $W_1\alpha$, that is, real wages (or the value of wage-goods that could have been sold if the totality of wages paid at the end of period 1 had been spent by workers). Observe also that (c) + (d) is equal to πW_1, that is, profit that could have been generated if the totality of wages paid at the end of period 1 had been spent (it is also equal to the value of goods unsold in the case that all wages paid at the end of the first period are spent). Notice also that (b) + (c) + (d) is the value of wage-goods unsold in period 1, WGU_1:

$$WGU_1 = s_w W_1 + P_1$$

Recall that (a) is the value of wage-goods sold in period 1, C_1, while (b) + (d) is saving of wages in period 1, S_{w1}, and (c) is profit formed, P_1, that *can be invested* (*capital-time* by using Schmitt's terminology) in the production of capital-goods:

$$Y_1 = C_1 + S_{w1} + P_1$$

We compute output at the end of the second period as the sum of wages paid in periods 1 and 2. In other words, total output is equal to the value of wage-goods produced in period 1 plus the value of capital-goods produced in period 2. We obtain that total output is:

$$Y_2 = W_1(1 + s_p c_w \pi)$$

Also in this case, a graph illustrates the dynamics of the process. Figure 3.5 shows that the expenditure of nominal wages worth 70 m.u. (out of total wages worth 100 m.u.) has generated a profit of 14 m.u., and that income earners have purchased

wage goods valued at 56 m.u.. Wages amounting to 56 m.u. have been definitively spent at the end of period 1. Sixty percent of the profit (8.4 m.u.) has then been invested in the production of capital goods and the other forty percent (5.6 m.u.) has been distributed to shareholders. Remaining bank deposits have then been destroyed in the expenditure of the nominal saving of households, of wages of the second period and of dividends. Observe that profit has been made, in this case, thanks only to the partial expenditure of income in the first period.

FIGURE 3.5 *Total output value over two-time periods*

56 m.u.	14 m.u.	30 m.u.	8.4 m.u.

Source: *author's elaboration*

Now, generalizing our previous reasoning, we obtain the equation of total output:

$$Y_2 = W_1 + s_p P_1$$

being (i) macroeconomic investment or saving equal to profit invested:

$$I = S = s_p P_1$$

and (ii) the value of wage-goods unsold:

$$WGU_1 = s_w W_1 + P_1$$

'From the time of Say and Ricardo the classical economists have taught that supply creates its own demand; - meaning by this in some significant, but not clearly defined, sense that the whole of the costs of production must necessarily be spent in the aggregate, directly or indirectly, on purchasing the product' (Keynes 1936 [1964]: 18). This applies to the monetary theory developed here, whatever value the saving rates from wages and from profit may have.

A final consideration is in order. In an economy where profit has been invested in the production of capital-goods, and wage-goods have been completely sold, output is equal to the sum of the value of wage-goods and the value of capital formed, that is, profit *invested* or finally *saved* by the society as a whole:

$$Y_2 = W_1 + P_i = W_1 + s_P P_1$$

which is tantamount to asserting that the value of output is identical to the value of consumption plus the value of investment.

In this respect new light is thrown on Keynes's "truisms" resulting 'from the equality between aggregate Income (Y) […] and aggregate Disbursement (D) which is the sum of Consumption-expenditure (C) and Investment (I)' (1933 [1979]: 68-69). National output, identical to income, can be defined as the value of wage-goods plus the value of capital-goods, namely the sum of wages and profit *invested*. Once again, macroeconomic investment or saving is always equal to invested profit.

Now, before extending the analysis to the study of the long-run, a few remarks are worth making.

Identities and dynamics: some comments

Economic activity is influenced both by the ability of income-earners to purchase the macroeconomic product (demand), and by the effective availability of the product

(supply). It follows that any demand or supply oriented economic theory should be seriously cast into doubt. It can be argued, indeed, there is a symmetrical relationship between supply and demand. Such a symmetry should be evident by a simple look at bank books: produced output is the object of bank loans to the industrial system (the asset side of balance sheets); such borrowings from companies are always necessarily matched by households deposits (the liability side of bank books).

The concept of symmetry is not extended to the concept of supply and demand alone, but also to the concept of macroeconomic saving and investment. The sole study of individual saving, microeconomic in nature, is insufficient to explain the existence of profit and therefore fixed capital. Only an identity-relationship between macroeconomic saving and investment can explain the possible existence of a type of macroeconomic saving even when individual savings are null.

In modern economies, wages expenditure and a mark-up between the price and the cost of production allow for the formation of a macroeconomic profit that, let us recall it, corresponds to society's current sacrificed consumption. It is thanks to this particular kind of saving that companies are endowed with the funds to carry out investment activities. Further, it might also be the case that banks grant loans to companies, in order for them to access to an even greater amount of funds to be invested. Modern banking techniques are so advanced that nothing prevents – and nothing should prevent – banks from lending money to companies. Whenever companies borrow money from the bank system, banks are lending individuals' savings. It might even be the case that banks lend beyond the deposit level, giving rise to a mismatch between income as such (the monetized product) and monetary deposits – what can be defined as an inflationary phenomenon, given a fall in the purchasing power of money units. Borrowing Ricardo's words, '[w]ilst the Bank is willing to lend, borrowers will always exist, so that there can be no limit to their over-issues' (1809 [2004]: 17, III).

Now, when models are built on the basis of a specific theory, and therefore a number of specific hypotheses, the equations and functions under study are not necessarily developed on the basis of observations of economic reality. They are often wrong-

ly made, in fact, to suit the requirements of the model. See for example Sraffa (1960: §
24, our italics) on this point: '[a] mixture of commodities, however, or a "composite
commodity" […] could be "blended" *to suit our requirements*, modifying its composi-
tion so as to smooth out a price-bulge at one wage-level or to fill in a depression at
another level'. A trial and error approach is used in this context, a model being built
according to a number of formal conditions (these following one hypothesis rather than
another) and tested using data gathered from research institutes. If the model's output is
in line with the data gathered, then the model is believed to be a credible simulation of
the economic structure, following which it is perfected so far as possible. In some cases
the model may prove to be a useful tool in forecasting economic trends, albeit only
temporarily. In fact, it may well happen that after a certain period of time the model
ceases to function. A good example of this is the MIT-Penn-FED econometric model
(developed by a group of economists headed by Franco Modigliani, Albert Ando and
Frank De Leeuw), used by the Federal Reserve and elaborated by the Bank of Italy
during a certain number of years (e.g., see Papademos 2005). On the other hand, if,
from the very start, the model gives results that are not in line with the data gathered,
the model is abandoned in the search for one with better predictive capabilities.
'[M]odel A would have to be preferred to model B if A provides a better simulation of
reality than B' (Cencini 2005: 59).

This is a burning issue. By taking sides in favor of a specific economic theory,
an economist falls easily into an ideological and dogmatic trap. It is, in fact, quite likely
that the choice of one approach over another is dictated by motivations alien to logic.
Anyone with mathematical skills and a neoclassical background will probably have
found it satisfying to solve certain models of equilibrium and will be little inclined to
abandon their use. Whoever, instead, has a natural tendency towards a more humanistic-
sociological approach to economics will, in all probability, be more attracted to Keynes-
ian or classical studies (of Marx, for example). In this case, too, there will be little
inclination to abandon such studies should it prove necessary. Further, economists
rarely reject the economic thought they have been taught over life, even in those cases

where it has been showed as a fallacious stream of thought. It is quite clear that the choice of a theoretical approach to economics cannot be made on the basis of a personal taste for mathematics or literature, nor of loyalty to a specific thought line. A single path leads to the door to knowledge: that is, the internal consistency of any theory, in any field of learning, should stand the test of logic.

Now, the trial and error method (and thus the use of modelling) is certainly valid for the natural sciences. If economics were a discipline sharing traits with the natural sciences, then the trial and error method would have a *raison d'être*. But can economics be placed among the natural sciences? (On this matter see, for instance, Hicks 1986; Schmitt 1986). Economic activity and bank systems are certainly created and managed by Man. Logic seems to be then at the very foundations of economics. Following this line of thought, economists must study economic systems (especially the banking system) as created by humans. It is therefore reasonable to consider what happens to economic theory if the trial and error method is substituted by an exclusive use of logical reasoning, at least during the construction phase of economic theory. This does not suggest that mathematics should be abandoned. Even though it is of no use in the search for the macroeconomic laws governing our economic systems, mathematical modelling might prove useful in the field of microeconomics. Skillful mathematicians remain without doubt an essential resource in this field, although modern information technology can perform so many functions unaided. However, the efficient functioning of the system requires a theory that is internally logical.

The rejection of general economic equilibrium necessarily implies a change in how economists should conceive economic dynamics. General equilibrium approach currently is to be found in DSGE models. Neoclassical growth theory, i.e. mainstream economics, conceives economic growth as a dynamic process determined by a number of magnitudes ("forces") inserted in mathematical functions. The optimization of these functions guarantees, theoretically, the existence of a balanced growth over continuous or discontinuous time. Hence, the type of change within neoclassical growth models implies, for instance, that national output continually grows over time, following a

precise 'path' where economic magnitudes (for instance, the number of individuals or households, leisure time, consumption level, etc.) behave in a specific manner. As soon as the concept of equilibrium is discarded from economic analysis, a different kind of economic dynamics comes to the fore.

'If no adjustment between supply and demand were possible, […] [t]he transition from one pair of supply and demand to another would still be possible, but it would not occur as the result of an interaction among functionally related variables. Dynamics would then be akin to a quantum-like transition rather than to a continuous or discontinuous type of change. The choice between these two approaches to economics is not arbitrary' (Cencini 2005: 62). This is tantamount to saying that output levels over time, instead of being determined by the mutual adjustment of different forces, are determined by a number of instantaneous acts of creation and destruction of wage incomes. Further, bank deposits (a temporary monetary capital) exist between the instant every income is created and the time it is finally spent. This meaning that, by referring to the equalities between product and income, and saving and investment, economists must define them as identities. Further, whenever such relationships are conceived of as identities, one must ascertain whether they are nominal identities rather than logical identities.

The law of identity, which is attributed to Aristotle, states that every magnitude is identical to itself. In *Summa contra Gentiles*, Thomas Aquinas had recognized in this concept the statute of truth known in itself, as A is A. This is stated explicitly by Wolff in terms of the principle of "non contradiction". Between the 19th and 20th Centuries, various philosophers, including Frege, investigated the concept of identity. In particular, saying that A is B means giving two different names to the same object. This might seem obvious. However, such an identity might be informative in nature and not simply nominal. In such a case, the identity is always true in itself, by logic – not simply by definition –, for which reason it is termed a logical identity. Studied as logical identities, the relationships between demand and supply, and saving and investment, are always

true: therefore, they cannot be mutually adjusting forces in a Walrasian optimization framework.

In the *General Theory*, the fundamental equation of income, thought of by Keynes as the (monetary) value of total product (output), is as follows: '[i]ncome = value of output = consumption + investment' (Keynes 1936 [1964]: 63). Income arisen with the production of wage-goods and investment-goods is necessarily equal to the income spent in purchasing such goods. 'If this equality is taken to be a condition of equilibrium verified only for a given level of national income, Keynes's theory is but a particular case of equilibrium analysis' (Cencini 2005: 69). If, on the contrary, the equality holds always true, given whatever income level, consequences for economic theory are considerable. Total investment necessarily amounts to macroeconomic (or national) saving: given whatever income level, national saving and investment 'are simultaneously determined, investment being financed by that part of income that is not definitively consumed, and macroeconomic saving being formed through the investment of the same part of current income' (Cencini 2005: 71). The rejection of economic equilibrium theory implies, hence, the refusal of the theoretical possibility for an economy to follow a *balanced growth path*.

Income, consumption, and investment: some comments

Effective demand, meaning the determination of short-run income, is an important theme in the *General Theory* (see Pasinetti 1973: 223). The consumption function plays an especially fundamental role in determining income, this forming the basis for models proposed by economists following the same lines as Keynes, with particular reference to Harrod, Domar and Kaldor. In traditional Keynesian analysis, households' consumption is considered a function of income. Specifically, consumption is made to depend upon factor C^*, indicated as minimum physiological consumption, and upon factor cY, where c is the marginal propensity to consume. This function is extremely important in under-

standing the technical apparatus developed using it as a starting point. In fact, by means of substitution and differentiation, this leads to the concept that 'has become the dominant theme of all subsequent macroeconomic analysis' (Pasinetti 1973: 224, our translation). Namely, the concept of 'multiplier', already proposed by Kahn (1931), according to which a variation in the level of investment would create an even greater variation in income level.

It should be noted that not only have post-Keynesian authors studied consumption, but also the majority of neoclassical authors, who, more particularly, have employed it in the development of the so-called 'neoclassical synthesis'. According to the simple or short-run Keynesian model, income at equilibrium is determined by solving the system of two independent equations. The first equation is the Keynesian identity (transformed in a conditional equality) between income, Y, and the sum of consumption, C, and investment, I:

$$Y = C + I$$

where investment, I, is a constant. The second equation is:

$$C = C^* + cY$$

where C^* is subsistence consumption, and c the propensity to consume.

Now, the determination of short-run income has become the subject of the 'income-expenditure diagram', known as the 'Keynesian cross' or '45° diagram', proposed by Samuelson, in 1948, in his textbook *Economics* (see Samuelson 1948 [1980]). The diagram has been developed over the years and a recent version is given in Figure 3.6.

FIGURE 3.6 *The 'Keynesian cross' diagram*
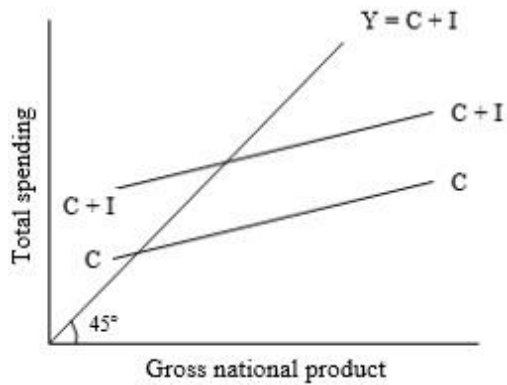
Source: *author's elaboration based on Samuelson (1948 [1980]: 213).*

The diagram shows levels of consumption and investment on the *y* axis and the level of consumption on the *x* axis. The bisecting line is at the position of the points in which supply (income) is equal to demand (the total for consumption and investment). A further two half lines are present: that for consumption, with the intercept *C**, and that representing *C+I*, with intercept *C*+I* (where *I*, it should be remembered, is constant).

Although extremely effective from a didactic point of view, two problems arise with the Keynesian model for determining income, once it is applied to reality (Cencini 2005, 2015).

The first thing to be considered is the nature of consumption. Although it is correct to think that every living being has to consume a stock of goods to live and that it consequently needs a minimum of physiological consumption to survive, what really matters in economic research is not the question of possible physical consumption, but rather the link between consumption and income. In economics, consumption never possesses an exclusively physical nature: in fact, how could consumption take place in the absence of income? The idea, contained in the standard Keynesian model, of minimum consumption whenever household income is null, appears unrealistic. Individuals cannot spend inexistent income on purchasing a stock of goods to satisfy minimum physiological needs.

A second observation relates, instead, to investment. In the Keynesian cross diagram, the bisector is the *locus* of points in which income is equal to *C+I*. More specifically, at each point of the bisector, investment is always effective. Namely, coordinates of the bisector represent the income that has been formed following an effective production of investment or capital goods. However, from an economic viewpoint, no investment activity can take place if income is null. Yet the traditional Keynesian model presumes investment to be positive even when income is null. The preceding observations are brief, but apparently far-reaching. Consumption and investment lines, in the Cartesian diagram, must necessarily begin from the origin. Starting from the origin, the half lines would never intercept the line at 45°. This implies that no equilibrium income can be determined by the Keynesian model.

IS and LM: new diagrams

The IS-LM model (Hicks 1937) has enjoyed an enormous success, having been adopted by a majority of economists in all courses and economics texts. Criticisms of the IS-LM model are well-known (see, for example, Vercelli 1991; Hicks himself 1975, 1980-1). Yet there has been no serious consideration of them by economists, who have continued to use it for almost a century. Moreover, the model is still in use today as the most faithful interpretation of Keynes's theory from 1936. Thus, not only is it a neoclassical artifice with economic equilibrium as its principal concept, but it also seems able to explain the very theory that Keynes had elaborated with the explicit aim of countering neoclassical economics. The IS-LM diagram is well-known and is represented in Figure 3.7.

FIGURE 3.7 *The IS-LM diagram*
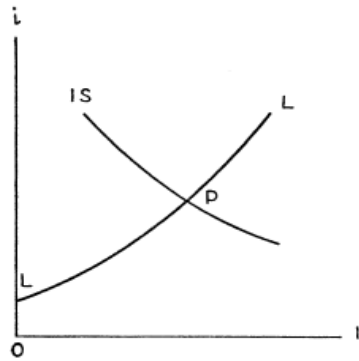
Source: *Hicks 1937: 153.*

Note: *Before 1949, the LM curve was called LL. I stands for income.*

The IS curve is the *locus* of points in which households' savings, *S*, and investment, *I*, are in equilibrium. An adjustment between savings and investment determines income at equilibrium (given all other income levels, *S* and *I* diverge). Further, according to Hicks' interpretation of the *General Theory*, the supply of and demand for money are two distinct magnitudes that meet, achieving equilibrium, at the points placed along the LM curve.

We shall follow Cencini (2003, 2015), Cencini and Rossi (2015), and propose new IS and LM diagrams in light of the analysis carried out in this Chapter. An observation is required here. In the analysis that follows, *S* refers to macroeconomic saving, i.e. invested profit, not to savings as traditionally intended, i.e. individuals' saving.

Although fluctuations in interest rates affect economic agents' projects for saving and investment, once profit has been invested, *I* becomes definitive and necessarily coincides with macroeconomic saving. Since effective investment determines macroeconomic saving, it follows that the relationship between *I* and *S* is necessarily one of identity. Investment is society's saving. Therefore, effective or realized investment of necessity coincides with savings. When wages are fully spent, it is logical to assert that individuals' savings are null. Nonetheless, as soon as a companies' profit forms, com-

panies' bank deposits are positive. At the same time, a stock of unsold goods lies in companies' warehouses. It can be argued then that, allowing for a profit to form, society sacrifices part of its current consumption. Society *saves* a fraction of the product, which is physically stocked within the industrial system and monetarily deposited in bank deposits. The ultimate goal of profit formation is to provide companies with a certain amount of funds to be invested. *Ex ante*, which is to say, before consumption has taken place, S and I are virtual, not real, magnitudes. Savings and investment are foreseen by, respectively, consumers and companies, but they cannot interact because they have not yet occurred. Once S and I become real, they are necessarily identical and, therefore, cannot reciprocally adjust each other *ex post*, that is, subsequently to consumption.

Reasoning must move beyond the concept of equilibrium, with an analysis of investment and savings inevitably taking on board the concept of identity. A direct consequence of the logical impossibility of adjustment between investment and savings consists in representing I and S by means of a finite number of discontinuous points, corresponding to a given level of interest, r, and a given level of income. Figure 3.8 shows this interpretation, according to which each point 'indicates the level reached by the identity between savings and investment in any period in which they have effectively taken place' (Cencini 2015: 136, our translation).

FIGURE 3.8 *The identity between macroeconomic saving and investment*
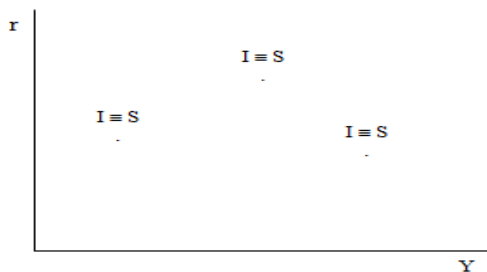
Source: *Cencini 2003: 312.*

Now, neoclassical theory is constructed around the postulate of homogeneity, meaning it is based on the dichotomy between real variables and monetary variables. If this dichotomy is respected, then the IS line represents the real dimension, while the LM curve represents the monetary dimension. However, in this case both curves could not be represented on the same graph. If the opposite is the case, meaning that IS is defined in terms of monetary income, both curves can be represented on the same diagram, but the postulate of homogeneity is no longer respected. We must therefore consider whether this problem also exists in the case of saving and investment. Two options appear logical: (i) the postulate of homogeneity proves true and the IS-LM diagram is rejected (both versions, equilibrium- and identity- based) or (ii) the postulate of homogeneity is rejected and the IS-LM model is accepted (in one of its two versions). Inevitably, the preceding considerations as to the possibility of an *ex ante* adjustment between I and S lead us to discard the traditional diagram. However, the postulate of homogeneity also causes us to reject the revised diagram, in which the identity between I and S is represented. Further, the hypothesis that saving and investment are exclusively physical in nature does not seem plausible: in modern economies, money matters, i.e. economic theory cannot do without a deep study of monetary magnitudes. Hence, this last hypothesis should also be discarded.

The previous considerations open a new line of interpretation concerning the identity between I and S. I and S possess, simultaneously, a physical and a monetary dimensions. Being this the case, the diagram representing identity (Figure 3.8) would have a logical reason to exist.

This line of reasoning can be applied symmetrically to the LM curve. The money-income supply is determined by production: wage-units are in fact the measure of the physical product. With the payment of wages, the physical product acquires a monetary form. It is in that very moment that income is created. Then again, there is no rational justification for the emission of bank money when no form of productive activity has taken place. Such money would be entirely unconnected to any kind of real activity or product. Bank money, inasmuch as it functions as a unit of account, would have no

reason to exist. At the same time, physical products, as well as services, possess no intrinsic economic nature unless they are monetized. In other words, monetary emission justifies, and is justified by, the productive activity of companies, which marks the transition from bilateral bartering to modern monetary economies. Thus, money and product form part of an indivisible unity: income. 'The identity between Y and C + I is an excellent demonstration of how the supply (Y) is always equal to the demand (C + I), for the simple reason that national income is measured indifferently by wages (production) and their final expenditure on the acquisition of consumer goods and in investment. Production creates the supply as well as the demand, each corresponding always to the other, as the joined effects of a single cause' (Cencini 2015: 138, our translation). The consequences of this observation for the LM curve are important. Keeping in mind the outcomes of monetary circuit theory concerning money, income, and investment (see Schmitt 1984, Carrera and Rossi 2015, Cencini and Rossi 2015), we must conclude as follows.

(i)   Since global demand is defined by national income and coincides with global supply;

(ii)   since economic production generates income;

(iii)   since economic production is an event in which products and services are instantaneously monetized:

(iv)   it follows that LM cannot be a function of income, of interest rates and of time and that

(v)   the supply and demand for money are represented by discontinuous points in the diagram giving income and time (Figure 3.9).

FIGURE 3.9 *The identity between money demand and money supply*
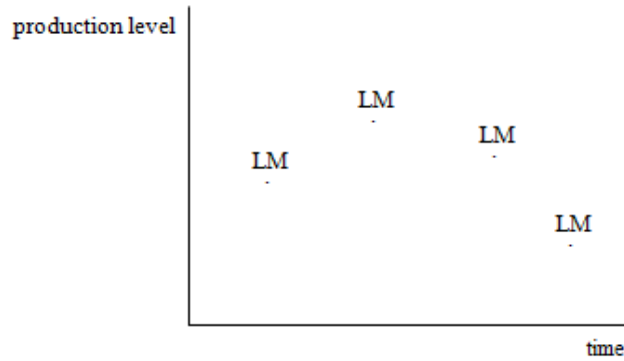
Source: *Cencini and Rossi 2015: 115.*

Investment: new causes for reflection

Let us get back now to the computers example. Profit has been made by the company and a stock of computers is still unsold. Supposing that profit distribution to shareholders is null, the company spends profit in a new payment of wages: otherwise said, profit is invested in a production of capital goods. Workers' bank accounts are credited with new wages (conversely, the company's debt will be registered in the asset side of the bank's balance sheet). Then, workers spend newly-paid wages in purchasing the stock of computers that still were unsold – let us suppose, for the sake of simplicity, at their production cost. Apparently, all these transactions are orderly made. Income has been entirely spent, as in the case when profit is simply distributed as dividends. Yet, capital-goods have been created thanks to profit investment: where has capital value gone? Further, are financial market fed by the deposits constituted as soon as profit is spent in the new payment of wages? These issues are strictly linked to inflation and windfall profits.

With regard to windfall profits, one line of research hypothesizes that the prerequisites for the creation of inflation are formed following profit investment (e.g. see Schmitt 1984). Inflation would take place in fact when bank loans are financed from deposits resulting from the investment of profits in new productive activities. Inflationary profits would arise then, being such deposits repeatedly lent over time. Moreover, in

this context, the invested profit is not 'initially' of an inflationary type. In fact, it seems possible to speak of investing inflationary profit only with the amortization of fixed capital. Inflationary profit appears to be a consequence of inflation, this being the numerical variance between global demand and global supply, and furthermore, it would appear to be to the sole benefit of companies and not the community. In the field of monetary circuit theory, the phenomenon is known as 'dual production' (see Schmitt, 1984).

Given that company profit and investment are vital to the society's wellbeing, banks' lending activity should be regulated in order for inflationary profit to be null and, ultimately, aiming at guaranteeing the orderly functioning of economic systems. Once again, Keynes offers us interesting causes for reflection in this regard. According to him, in fact, banks have, at least, two merits. First of all, '[p]lanned investment – i.e. investment ex ante – may have to secure its "financial provision" before the investment takes place; that is to say, before the corresponding saving has taken place' (Keynes 1937: 246). A 'particular piece of saving' must exist, this being 'earmarked against a particular piece of investment before either has occurred' (*ibid*.). According to Keynes, this is necessarily permitted by a technique that 'bridge[s] this gap between the time when the *decision* to invest is taken and the time when the correlative investment and saving actually occur' (*ibid*.). Inevitably, this gap is bridged thanks solely to financial intervention by banks. A second role attributed by Keynes to the banking system is even more interesting. 'If the banking system controls the terms of credit in such a way that savings are equal to the value of new investment, then the average price level of output as a whole is stable and corresponds to the average rate of remuneration of the factors of production' (Keynes 1930a [1971]: 165). And, in such a case, inflation and windfall profit will be null. In both cases, Keynes was referring to individuals' saving, but his intuition also holds true as soon as we think of macroeconomic saving. Modern banking activity, however, has no knowledge about the exact value of new investment, since investment levels – invested profit – are never tracked by banks. Profit, once invested, is transformed into a capital whose value escapes banks' books. The monetary counterpart

of physical capital goods escapes company's hands. Further, as soon as profit is spent in the payment of new wages, new deposits are formed. Being such deposits the object of banks' lending activity, financial market are fed by them time after time. This might be a major cause of inflation and windfall profit.

Profit, fixed capital, and interest

The value of any product is always determined by the wage units (or, more simply, wages) paid to workers. We have already given an explanation of how the value of capital is determined by the profit invested in the payment of wages to workers employed in the production of capital goods. Certain questions regarding a possible link between invested profit (fixed capital) and interest must inevitably be raised. We shall then discuss the matter of interest on loans for consumption, interest on fixed capital, and the existing relationship between the two. An in-depth analysis of interest in monetary circuit theory is to be found in Schmitt 1984, 1996c; Cencini 2005, 2015; and Cencini and Rossi 2015. We shall consider some of the fundamental aspects.

It is generally believed that interest is a cost of credit received. On the other hand, the interest rate is defined as the cost (depending on time) of money loaned (individual savings), understood as being a benefit received by savers-lenders. Keynes (1936 [1964]) was among those authors who sought to justify the existence of interest, defining it as recompense for a temporary waiving of liquidity. However, Wicksell had already raised a doubt concerning this (1912 [1997]: 21): '[i]t is no doubt somewhat easier to understand that wood and meat cost money, than that money costs more money, or that "savings have a price" – besides, the latter expression is quite unclear and somehow invites contradiction'. If savings (credit) were merchandise, then it would be correct to identify interest with its price, assuming this coincides with its cost of production. However, according to the analysis proposed so far, the income that makes up deposits is not a physical good. We must thus reject the hypothesis that interest is the

price or cost of a loan (an income saved by one individual that is loaned to another individual).

Interest is also frequently defined as the benefit in acquiring securities that are less secure than money, inasmuch as they are less liquid. Yet banknotes, for instance, do not earn interest, despite being the most 'liquid' security that exist. 'Both banknotes and bank deposits are securities, and if interest rewarded the risk implied in their use, then banknotes would have to be the major beneficiary' (Cencini 2015: 152, our translation).

Interest is also defined as the cost of capital. Identifying interest with the production cost of capital means claiming that interest is equivalent to wages paid for the production of fixed capital. It is therefore necessary to establish whether this is correct. Let us pursue the lines of enquiry followed by Wicksell and Böhm-Bawerk, according to which interest is the benefit from the use of capital. If interest is a benefit for capitalists deriving from capital, do we have to believe that the value or cost of capital production is ceded to the capitalists? It is quite possible, by contrast, that interest corresponds to the value of production created thanks to technical progress – i.e. thanks to instrumental capital. The answer is by no means obvious. Böhm-Bawerk (1889 [1959]) believed that capital increases the physical productivity of labor. To explain the contribution of capital, Böhm-Bawerk introduced the 'roundabout methods of production' and the average time needed to produce capital goods. Capital contributes indirectly: '[c]apital does not independently deliver an impulse, it merely transmits an impulse delivered by originary productive forces' (1889 [1959]: 95, II), which is to say, labour. If this increase in the productivity of labor, thanks to the use of capital, is not expressed simply in physical terms, but also in those of value, it follows that capital adds value to that created by labor. In calculating the total value of production, as well as wage goods and capital goods, the value of interest goods should also be included. It should not be forgotten that the value of each type of good is expressed exclusively in wage units.

More light needs to be cast on the nature of interest. We may draw from the teachings of monetary circuit theory in order to understand the nature of interest and consumption loans, and the nature of interest paid to owners of fixed capital.

Interest on consumption loans

Interest on consumption loans has been defined by Böhm-Bawerk using the German term *Leihzins*. We shall also use this term in the pages that follow. Monetary circuit theory considers it a microeconomic type of interest, since it is an income whose existence alters the way in which national income is shared among households although the total sum remains unchanged. We shall explain this concept better by means of the example that follows.

Let us suppose that income earners 1 – IE1 – receive wages for 80 and IE2 receive wages for 20:

$$\text{IE1 } 80 + \text{IE2 } 20 = 100 \text{ m.u.}$$

If a part of IE1's deposits, corresponding to 10 m.u., is lent to IE2, IE1's deposits decrease by 10 m.u.; on the other hand, IE2's deposits increase by 10 m.u., from 20 to 30 m.u.:

$$\text{IE1 } 70 + \text{IE2 } 30 = 100 \text{ m.u.}$$

The total sum for deposits remains unchanged and corresponds, both before and after the loan, to 100 m.u. For simplicity, let us suppose that the income that makes up the deposits is not spent.

The following month, IE1 receive a further 80 and IE2 receive 20.

$$\text{IE1 } 80 + \text{IE2 } 20 = 100 \text{ m.u.}$$

If IE2 repay 10 to IE1, plus interest, let us suppose of 2, IE1's deposits increase by 12 and IE2's deposits decrease by 12:

$$IE1\ 92 + IE2\ 8 = 100 \text{ m.u.}$$

The total sum for deposits remains unchanged and in this case, too, amounts to 100 m.u.

Supposing the new income not be spent, the total for bank deposits amounts to a temporary capital (bank deposits) of 200 m.u. IE1 and IE2 are therefore free to dispose of a total income of 200 m.u. The *Leihzins* is thereby 'linked to a *reversible capital-time* (that is, a capital that will eventually be reconverted into income and spent on the commodity market)' (Cencini 2005: 145).

IE1 have received wages of 160 m.u., and have also received an interest of 2 m.u., deriving from IE2's wages:

$$(80 - 10) + (80 + 10 + 2)\ = 162 \text{ m.u.}$$

On the other hand, IE2 have received wages for a total of 40, 2 m.u. of which corresponds to interest paid to IE1.

$$(20 + 10) + (20 - 10 - 2) = 38 \text{ m.u.}$$

Obviously, the example given is for didactic purposes. In reality, borrowers spend their own income, together with the short-term loan received, to purchase goods and services. Our example appears more plausible once we assume that IE2 spend their wage income, and the loan initially given, almost immediately (20 + 10, respectively). For a certain period, IE1 waive the expenditure of 10 m.u. of their initial income (80 m.u.). IE1 will be able to spend the 10 m.u. at a later date, once the debit-credit has been extinguished. Once they have received the interest of 2 m.u., IE1 will also be able to spend this interest on the purchase of further goods and services. 'The income saved and lent to consumers defines an exchange between a present and a future capital. Some consumers spend today the income saved by other potential consumers and will in the future save part of their new income in order to pay back the initial loan' (Cencini 2005:

145). The consumption loan does not generate new income, since it exclusively modifies the sharing-out of income among individuals. There is no net saving and, therefore, the entire income is spent definitively, sooner or later. Interest on consumption loans is linked to neither savings nor investment, and is to be distinguished from interest paid on fixed, or instrumental, capital.

Wicksell had already contemplated the existence of a difference between interest on consumption and interest on fixed capital. '[I]nterest on pure consumption loans […] is no part of the large social income categories: wages, rents and (with respect to the whole economy, as derived from social production) interest' (Wicksell 1912 [1997]: 23-4). We should therefore make a few observations concerning the relationship between interest and fixed capital.

Interest on fixed capital

Besides the *Leihzins*, another type of interest exists that Böhm-Bawerk called *Urzins*. *Urzins* is an income distributed to the owners of fixed capital. The terminology used by Böhm-Bawerk is also employed once more in the theory presented in these pages. The analysis undertaken so far has shown that capital is a means of production. Given this, it increases the physical production of labor, but is not a productive factor of value in the same way as labor. Capital has its own value, inasmuch as it is a product of labor, yet does not directly create economic value. This observation is useful in understanding that 'the increase in physical productivity is not a measure of interest' (Cencini 2005: 149). We should consider whether it is possible, in any case, to derive a macroeconomic interest or income from capital. That is, we should determine whether it is possible to pay interest to capitalists *without,* '*that fixed capital loses part of its value in the form of interest or that capital is itself the source of income*' (Cencini 2005: 150).

Since it remains true that value is determined by labour alone and that wages are the sole source of income, interest can be a macroeconomic magnitude only if it is derived from wages (Cencini 2005: 150).

As with profit, interest may also be made up of part of the wages intercepted by companies. We presented, above, a numerical example in which households spent their income of 100 m.u. entirely, thereby giving rise to a company profit of 20 m.u. We also supposed that other incomes, including interest and revenue, were null. If we now assume that interest must be paid to capitalists, we immediately note that, so long as the *Urzins* is positive, the macroeconomic price of wage goods should be initially greater than their value. That is, their price should be inclusive of the price of interest goods. In fact, the general rule holds, according to which the price of wage goods is inclusive of *all* other, non-wage, goods, such as profit goods, dividend goods, interest goods, income goods, etc. (see Schmitt 1984: 142 and Cencini 2005: 148). Indeed, nominal wages initially paid include (i) real wages corresponding to the value of wage goods, and (ii) the value of all other goods, such as profit goods, dividend goods, interest goods, income goods, etc. It should be remembered that, 'the excess of prices over costs finally dissolves because […] *the payment of wages includes the expenditure of profits*' (Cencini 2005: 148):

wage goods of a value of 80 units are sold at a price of 100 units, which are inclusive of the price of non-wage goods (20 units). It thus follows that the actual price of wage goods only (100 units − 20 units) is exactly equal to their value (Cencini 2005: 148).

The reasoning applied to profit goods is equally valid for all other goods, including interest goods. Given the existence of capital (invested profit), its owners have a right to interest as recompense for the (macroeconomic) saving undertaken. Therefore, given a wage payment of 100 m.u., interest must inevitably originate from this. Abstracting

from profit formation, the macroeconomic price of the product, greater than production costs, will include the value of interest goods. For instance, if interest amounts to 5 m.u. (25% of the value of the capital – 20 m.u.), nominal wages initially paid (100 m.u.) include the production cost of wage goods (95 m.u.) and the production cost of interest goods (5 m.u.). The payment of interest is justified by the existence of fixed capital. As shown by Schmitt (1998), it can also be maintained that the total value of production is 105 m.u. This is so, because the increase in physical productivity due to the presence of fixed capital is transformed into an increase in value. Labor remains the only source of value, but the value it creates is increased, multiplied by a factor that, in our example, is equal to 1.05. Let us focus on this issue more thoughtfully. In the absence of interest, workers would benefit entirely from increased physical productivity due to instrumental capital. The total value of production would be 100 m.u. With interest payment, on the other hand, product value (wage goods and interest goods) increases to 105 m.u. With respect to the former instance, product value therefore increases by a multiplier of 1.05. Workers and interest owners will be able to acquire physical products to a value of 100 m.u. and 5 m.u., respectively.

Unlike interest on loans, *Urzins* is a macroeconomic income created *ex novo* thanks to the existence of fixed capital. It is thus a macroeconomic income inasmuch as its existence does not lead to the simple redistribution of global income among households, as is the case for consumption loans, being due, instead, to the creation of a new production income. Macroeconomic interest is a type of income distributed to capitalists as compensation whenever their savings are invested in a new production of capital goods. Therefore *Urzins* represents the compensation of capitalists who decide to waive a part of company profit so as to create instrumental goods. 'The transformation of saving into a macroeconomic capital – its investment – defines the final loss of an equal amount of income, and interest is the compensation for this loss' (Cencini 2005: 150). By foregoing, in part, a final expenditure of their income in the product market, capitalists forego the consumption of wage goods so as to create fixed capital. We should reiterate that this is the reason macroeconomic interest is paid to them. *Urzins* 'is

derived from an *irreversible, fixed capital* (that is, a capital defining a macroeconomic saving)' (Cencini 2005: 145).

Natural and market interest rates

Although Keynes is among those authors who preeminently considered the question of natural interest rates and market interest rates (especially in his *Treatise on Money*), there was, preceding him, another economist who occupied himself with the matter in hand. We find, in fact, ideas of great interest in the writings of Wicksell.

Wicksell defined the natural interest rate as 'the rate of interest which would be determined by supply and demand if no use were made of money and all lending were effected in the form of real capital goods' (1898 [1965]: 102). The monetary, or market, interest rate is, instead, the interest rate fixed for credit transactions between individual savers and companies. If the two rates diverge, then the level of production and price will vary until natural and market interest rates coincide. To explain this adjustment of the two interest rates, Wicksell resorts to the concept of equilibrium. However, the idea of a dependency between the two rates is also to be found in monetary circuit analysis (see Schmitt 1984; Cencini 2005, 2015; Cencini and Rossi 2015).

We have previously noted that interest is the compensation paid to capitalists for investment activity. Therefore, interest rate is defined as the ratio of interest over fixed capital. According to an interesting intuition (to be found in Schmitt 1996c: 38), in an orderly system – i.e. once full structural employment is achieved – interest rate or natural interest rate would equal what has been called Euler's number, *e*, the mathematical constant discovered by the Swiss mathematician Jacob Bernoulli, an expert in interest theory. Interest on consumption loans is called, instead, market interest. According to monetary circuit theory, the market rate would depend on the natural interest rate. In fact, in order to obtain a consumption loan, borrowers must offer a market interest rate that is higher than, or equal to, the natural interest rate. Were this not the case,

investment activity in production activity would always be more advantageous than that of loans.

Even though Wicksell considered it as an equilibrium variable, the natural rate of interest can be considered as the rate determined in any given economy between interest and capital or, since interest is derived from profit, between profit and capital. In other words, it is licit to interpret Wicksell's natural rate of interest as the rate of profit. Quite interestingly, a correlation between the market interest rate and the natural interest rate would appear to be confirmed through an observation of modern monetary economies. Market interest rates are increasingly lower, due to intervention by central banks in favor of industrial activity (and to the detriment of financial activities). Following central banks intervention, the market rate usually tends to fall short of the natural interest rate. The natural interest rate (the profit rate) is increasingly lower, for the profit-accumulated capital ratio decreases over time. The very reason of this tendency of the ratio to decrease is that profits can never be greater than wages. The decrease in the market interest rate follows, as an attempt, operated by central bank, to limit the damages to the real economy by the tendency of the profit rate to decrease. Traditional theory does not convincingly explain this tendency to decrease towards the usual lowest bound (zero).

ECONOMIC GROWTH

We analyze here the payment of wages over a single time-period and over infinite periods. We seek to find the price of domestic output, as divided into wage and capital goods. In order to do so, we assume constant rates of saving of wages and profits, by extending the logic of the two-time study carried out in this work to infinite periods. The previous examples describe different processes of capital formations. Yet, initial wages are different. The two analyses are *numerically* equal inasmuch as the overall cost of capital is, in both cases, equal to 25 m.u.

One time-period

Let us suppose that, thanks to the intermediation of banks, income-earners' deposits are credited with wages for 125 money units (m.u.), following a production of consumption and capital goods. Also, suppose that the value of capital equals one fifth of total product value, i.e. 25 m.u. As soon as the company sells consumption goods (the value of which is 100 m.u.) at a price of 125 m.u., a profit of 25 m.u. is made. Company's proceedings are such that productive costs – of both consumption and capital goods – have been fully covered. In particular, it is thanks to profit that the company covers the costs of production of capital goods. Once again, as observed in the two-periods analysis, when wages are spent, a profit forms; when wages are paid, profit is spent (Schmitt 1984: 479).

Infinite time-periods: an upward bound to economic growth

Let us suppose that wages are always fully spent in the purchase of consumption goods, and profit is always fully invested in the productions of capital goods. Income earners'

expenditure of 100 m.u. wages in the purchase of wage goods at a price of 125 m.u. gives rise to a monetary profit of 20 m.u. and to corresponding physical goods temporarily stocked in the company. Profit is then invested by the company. Income earners are credited with new wages following the production of investment goods. As we assumed for the sake of simplicity a constant price / value ratio, the 20 m.u. stock is sold then at a price of 25 m.u. A stock worth 4 m.u. is still left unsold, and company's bank deposits are credited with 4 m.u. Supposing that a new production of investment goods takes place, income earners are credited with 4 m.u. Repeating the reasoning infinite times, wages payment takes place over infinite time-periods. Wages will follow a decreasing trend approaching zero (see Table 3.7).

TABLE 3.7 *Wages payments over infinite time-periods*

T	0	1	2	3	…	∞
W_t	100	20	4	0.8	…	→0

The process follows a geometrical progression. In particular, total investment over the infinite horizon has a value amounting to 25 m.u. Wages follow an exponential decay. In particular, wages follow a trend expressed by $W_t = W_0 e^{-\lambda t}$, where t = 0, 1, 2, 3, …, +∞. In our study case, λ = 1.6094. For instance, $4 = 100 e^{-2\lambda}$; λ= (ln25) / 2 = 1.6094. Total output value over the infinite horizon (125 m.u.) is: $Y_{TOT} = \sum_{n=0}^{\infty} W_0 q^n = W_0 \frac{1-q^n}{1-q}$, where

$q = e^{-\lambda} = \pi$. π is the rate of profit, and e is Euler number.

We have dealt so far with one single payment of wages, starting from which an infinite number of other wages payments has followed (through profit investment over infinite time-periods). In real-world economies, the creation of a net wage-income takes place every period, thanks to the credit lines granted by the banking system to firms. In fact, it is thanks to credit lines that companies, without disposing of previous funds, pay

wages to their employees. This amounts to saying that a process of income distribution and investment starts every time an initial payment of wages is made. Table 3.8 might help understand this issue.

TABLE 3.8 *Deposits growth (per month, in money-units): an upward bound*

0	1	2	3	4	5	6	7	8	9
100	20	4	0.8	0.16	0.032	0.0064	0.00128	0.000256	0.0000512
0	100	20	4	0.8	0.16	0.032	0.0064	0.00128	0.000256
0	0	100	20	4	0.8	0.16	0.032	0.0064	0.00128
0	0	0	100	20	4	0.8	0.16	0.032	0.0064
0	0	0	0	100	20	4	0.8	0.16	0.032
0	0	0	0	0	100	20	4	0.8	0.16
0	0	0	0	0	0	100	20	4	0.8
0	0	0	0	0	0	0	100	20	4
0	0	0	0	0	0	0	0	100	20
0	0	0	0	0	0	0	0	0	100
100	**120**	**124**	**124.8**	**124.96**	**124.99**	**124.9984**	**124.99968**	**124.999936**	**124.9999872**

Let us consider ten time-periods (from *t=0* to *t=9*), supposing that each time-period is equal to the solar month. Every month, thanks to banking intermediation, 100 m.u. wages are paid for the production of consumption goods. We also suppose that the profit rate is constant and equal to 0.2, and that profit is always fully invested in several productions of fixed capital. This means that, besides wages payment for the production of consumption goods, every month further wages payments also take place for the production of capital goods. The overall process leads to a monthly increase in the deposits level (as shown in the last row of Table 3.8): in particular, deposits approach

the upward bound of 125 m.u. This result would confirm the observation that, in certain historical times, the rate of capital growth tends to decrease (see, for instance, Baragar and Chernomas 2012).

For the sake of clarity, observe also Figure 3.10, which shows the deposits levels over 10 time-periods. At the beginning (t = 0), the first payment of wages gives rise to deposits amounting to 100 m.u. (nominal wages measure a physical stock of consumption goods). The following month, wages for 100 m.u. are paid for a new production of consumption goods. Meanwhile, 20 money-units are paid for the production of capital goods. The total deposits level equals 120 m.u. A similar reasoning can be extended to an infinite number of time-periods. It is of particular interest, indeed, that, after the first four months, the deposits level approaches the upward bound already.

FIGURE 3.10 *Deposits growth (per month, in money-units): an upward bound*
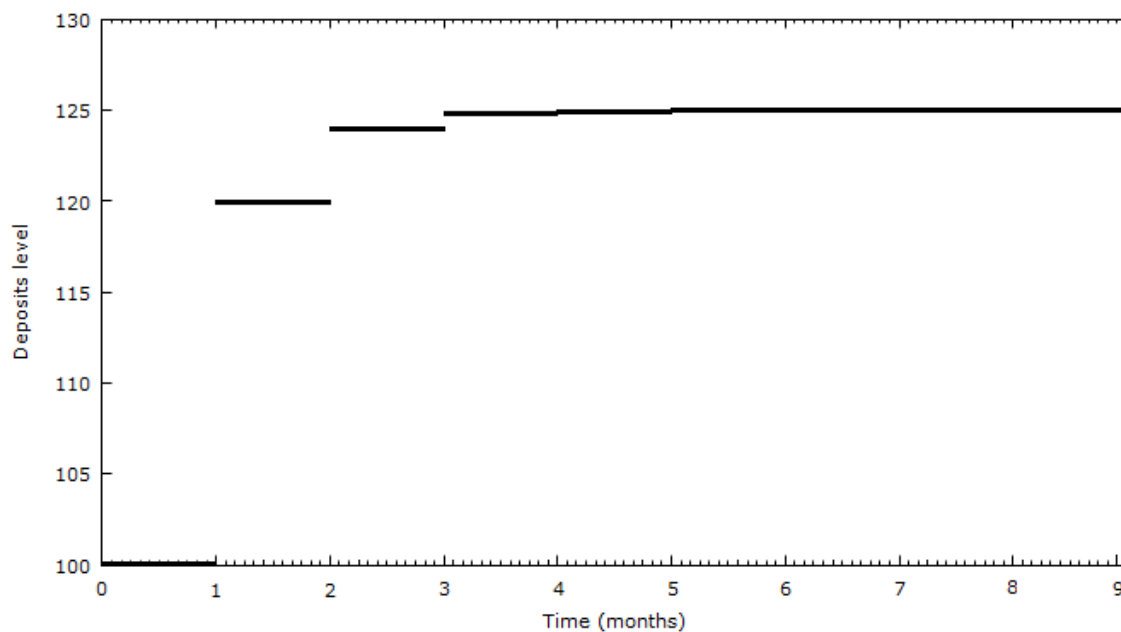
In particular, the deposits level at time *t* can be identified as follows:

$$Deposits_t = Deposits_0 \left(1 + \frac{\pi^{n+1} - \pi}{\pi - 1} \right)$$

where π is the profit rate.

The two analyses of wages payments in one period and over infinite time-periods do coincide. In particular, values and prices always match, either when a one-period analysis is made or when different productions are carried out over infinite time-periods. In the former analysis, the price of consumption goods (125 m.u.) includes the price of capital goods (25 m.u.); the price of total output is thus equal to the value of total output (total wages). In the latter case as well, the price of consumption goods (125 m.u.) includes the price of capital goods produced over infinite time-periods; hence, the initial price equals the value of the infinite productions of capital goods that take place over the infinite horizon.

We now need to carry out an analysis in greater depth of value creation in modern monetary economies, with the aim of analyzing an important problem. We shall proceed step by step. We have already noted that profit made by a company defines the total for bank deposits belonging to the company. The existence of profit allows for the remuneration of shareholders (dividends) and especially for investment activity. The latter leads to the creation of a new value, i.e. the value of capital goods. In fact, the payment of new wages brings about the creation of income belonging to the category of production. And yet the total sum for global deposits remains unvaried with respect to the previous situation. That is, when profit is invested, the total sum for deposits does not increase in line with the value of investment. Modern banking techniques do not in fact distinguish between transactions in which income is distributed and those in which new income is created. We shall analyze the issue at hand, using an analysis of real flows, monetary flows and real stocks.

IV Bank policy

Let us get back to the two-period example described in the previous chapter. Wages expenditure in the first period amounts to 100 m.u. Only 80 m.u. are finally spent, though. A profit of 20 m.u. is in fact made (and immediately spent to cover the costs of production of goods left unsold) by the company. A real goods stock is formed, corresponding to a capital-time of 20 m.u. Profit is obtained through wages expenditure only. In the second period, profit is invested by the company in the production of capital goods, which are acquired by the company in the payment of wages. The purchase of capital goods takes place at a price equal to their production cost. In exchange for the capital goods obtained by the company, workers obtain the previously unsold stock of wage goods.

Now, as will be shown shortly, two types of payment characterize monetary economies: those payments thanks to which income is formed (or, conversely, definitively spent), and those that channel the distribution of income from one agent to another. Bank systems, however, have no knowledge about whether actual payments belong to one category or the other. We will see that, as soon as investment is effective, the (con)fusion of the two kinds of payments inevitably leads to a nominal divergence between national demand (deposits) and national supply (output). We shall argue then that a reform of national payments system must be implemented. More precisely, we shall advocate the creation of bank departments, where record is kept of money creation/destruction, income (deposits), and investment (fixed capital or invested profit). Attention will be particularly paid to the relationship between the second and the third department, i.e. those of saving and fixed capital. We shall argue that a capital depart-

ment is needed to keep record of the value created with investment. Given that investment gives rise to a production-based income, the third department would allow production-based incomes (otherwise said, wage-incomes) to be distinguished from distributed incomes (such as profit).

A STOCK-FLOW CONSISTENT APPROACH

We will make here an analysis of monetary flows matrices and stocks (or balance-sheet) matrices –the so-called stock-flow consistent approach, SFC. As noted by Godley and Lavoie (2007: 6), a 'cardinal principle' must be applied in the study of macroeconomic flows, namely that 'all rows and all columns sum to zero, thus ensuring, as the phrase goes, that "everything comes from somewhere and everything goes somewhere"'. Godley and Lavoie, having built the 'transaction flow matrix', extend the approach to include a 'balance sheet matrix' (see Godley and Lavoie 2007: 7-8). In this study, we will consider the flows of wages and profits between productive firms and the house-holds only, strictly complying with the assumptions that banks are a mere intermediary agent between income earners and firms, and that, for simplicity's sake, taxes and public spending are nil. We shall state that, given an analysis of monetary flows, trans-actions appear to take place in a perfectly ordered way. In fact, both for profit distribu-tion and its investment, the sum of the data in the columns and that for the lines are null. On the other hand, a question will be raised concerning the analysis of real stocks. We shall not build a balance-sheet matrix. Nevertheless, comments will be made regarding the net worth of the economy, in which a representation will be given of monetary flows, real flows, and real stocks. A monetary disorder will be stressed.

Monetary flows

We shall look at the case in which income earners spend their income (wages, *W*) entirely (i.e. the saving rate from wages is nil) and in which company profit, *P*, is entirely invested (i.e. the saving rate from profit is equal to unity) in the production of capital goods. Monetary transactions taking place in this case are shown in Table 4.1. Wages during the first period represent a company outflow and a household income. When households spend wages on purchasing wage goods, the company registers a

monetary income and households register an operation opposite in kind. Flows do not show that, in this operation, a partial distribution of income has taken place; neither do flows show that the remaining part of income has been distributed to the company as profit. Now, the payment of new wages, during the second period, is registered exactly as for the payment of wages during the first period, since it is a new outflow for the company (an income for households). Transactions concerning consumption during the second period (which we presume takes place at cost price) are registered as for consumption during the first period.

TABLE 4.1 *Transactions flows matrix (I): full income expenditure and full profit investment*

	Firm	Households	$\sum$
Wages (1st period)	$-W_1$	$+W_1$	0
Nominal consumption (1st period)	$+W_1$	$-W_1$	0
Investment	$-P_1$	$+P_1$	0
Nominal consumption (2nd period)	$+P_1$	$-P_1$	0
$\sum$	0	0	

Table 4.1 shows that the total sum for company and households transactions (the columns) and the sum for reciprocal individual payments (the rows) are equal to zero. The total income for the system has been destroyed and there is no debit-credit relationship between company and households. An important observation should be made. The transactions we have registered in Table 4.1, relative to profit investment, are the same as those we would register in the case in which profit were entirely distributed among shareholders in the form of dividends. This means that an analysis of monetary flows allows for no distinction to be observed between activities related to income distribution and activities related to income (or value) creation, such as investment.

Table 4.2 shows monetary transactions related to investment and the payment of dividends, for the case in which wage income is not entirely spent (i.e. the saving rate from wages is positive, but lower than unity) and profit is partially distributed (i.e. the saving rate from profit is positive, but lower than one).

TABLE 4.2 *Transactions flows matrix (II): partial income expenditure and partial profit investment*

	Firm	Households	$\sum$
Wages (1st period)	$- W_1$	$+ W_1$	0
Nominal consumption (1st period)	$+ c_w W_1$	$- c_w W_1$	0
Investment	$- s_p P_1$	$+ s_p P_1$	0
Dividends	$- c_p P_1$	$+ c_p P_1$	0
Nominal consumption (2nd period)	$+ (s_p P_1 + c_p P_1 + s_w W_1)$	$- (s_p P_1 + c_p P_1 + s_w W_1)$	0
$\sum$	0	0	

As with Table 4.1, Table 4.2 shows that the sum for transactions in the columns and those on the rows are also nil. An analysis of monetary flows reveals no payment-related problems either in the case of dividend payments or in the case of investment. We shall continue with a comparative analysis of monetary flows, real flows and real stocks of wage goods and capital goods.

Monetary flows, real flows, and real stocks

We shall begin with an analysis of dividend payment and then, following this, the investment of profit in the production of capital goods.

Profit distribution

We now want to resume our study, in which income is completely spent by households. Let us suppose that profit is completely distributed as dividends among shareholders. Figure 4.1a shows a monetary flow, during the first period, of 100 m.u. from the company, *F*, to households, *W*. The real stock of wage goods has a value of 100 m.u. On the other hand, Figure 4.1b represents a money flow of 100 m.u. from *W* to *F*. A money flow of 20 m.u. should also be noted from *F* to shareholders and a real outflow of 80 m.u. from *F* to *W*. Figure 4.1c gives a monetary flow of 20 m.u. from shareholders to *F*, thanks to which there is a real outflow of 20 m.u. from *F* to shareholders.

FIGURE 4.1 *Profit distribution: flows and stocks*

   a) Monetary flow: 100 m.u. from the company to households.
       Real stock (stocked consumption goods): 100 m.u.
   b) Monetary flows: 100 m.u. from households to the company; 20 m.u. from the company to share-holders.
       Real flow (consumption goods from the company to households): 80 m.u.
       Real stock (stocked consumption goods): 20 m.u.
   c) Monetary flow: 20 m.u. from shareholders to the company.
       Real flow: 20 m.u. from the company to shareholders.
       Real stock: 0 m.u.

During these two periods, the company and those entitled to income have sustained monetary outflows of (100+20) m.u., while their monetary inflows are of (100+20) m.u. Therefore, there is an equivalence between monetary outflows and monetary inflows. If, instead, we analyze the value (production cost) of wage goods, we conclude that real outflows are of (80+20) m.u. The real stock at the end of period two amounts to 0 m.u. An analysis of stocks in the case of profit distribution (the payment of dividends) shows no divergence between supply and demand.

Profit investment

Finally, we shall undertake an analysis of the formation of capital goods. We shall return to the case studied above, supposing, however, that dividends are null and that profit is therefore entirely invested.

Figure 4.2a shows a monetary flow of 100 m.u. (the payment of wages during the first period) from the company, *F*, to households, *W*. A real stock of wages goods is formed, with a value of 100 m.u. On the other hand, Figure 4.2b shows the expenditure of wages in purchasing a part of the product. A monetary flow of 100 m.u. from *W* to *F* takes place. A real flow of 80 m.u. from *F* to *W* indicates a definitive expenditure of household income for the same amount. Figure 4.2c shows a monetary flow of 20 m.u. from *F* to *W* during the second period: a payment of wages has been made relative to the creation of a new product with a value of 20 m.u. (real stock). Finally, Figure 4.2d represents a monetary flow of 20 m.u. from *W* to *F* and a real flow of 20 m.u. from *F* to *W*, corresponding to the value of wage goods left unsold at the end of the first period and which have been sold at the end of the second period.

FIGURE 4.2 *Profit investment: flows and stocks*

   a)   Monetary flow: 100 m.u. from the company to households.
        Real stock (stocked consumption goods): 100 m.u.
   b)   Monetary flows: 100 m.u. from households to the company.
        Real flow (consumption goods from the company to households): 80 m.u.
        Real stock (stocked consumption goods): 20 m.u.
   c)   Monetary flow: 20 m.u. from the company to households.
        Real stock (capital goods): 20 m.u.
   d)   Monetary flow: 20 m.u. from households to the company.
        Real flow: 20 m.u. from the company to households.
        Real stock (stocked consumption goods): 0 m.u.
        Real stock (capital goods): 20 m.u.

An analysis of monetary flows (in- and out-) indicates no differences with regard to the previous case (just as we expected from a reading of the transaction flows matri-

ces). On the other hand, an analysis of real outflows and real stock is more interesting. Real outflows for the company corresponds to wage goods worth (80+20) m.u. The remaining real stock (of capital goods) for the company has a value of 20 m.u. Thus, productive activity has given rise to a supply of capital goods, no trace of which is to be found in bank balance sheets and which cannot be studied through an analysis of monetary flows alone. In bank balance sheets, the lack of a distinction between transactions of distributive and productive natures hinders the creation, when dealing with a supply of 120 m.u., of a demand for an equal amount. While the distribution and expenditure of profit in acquiring wage goods does not lie at the origins of any divide between supply and demand, the case of investment is, instead, anomalous.

A reform of the system of national payments is thus advocated: banks should keep record of every new product-based income, in order to guarantee that new goods and services are always matched by new bank deposits. A banking policy must be proposed that (i) permits a distinction between transactions of a distributive nature and those that arise whenever income is created and finally spent, and (ii) avoids economic activity being modified with respect to the present.

MONETARY DISORDERS: EARLY EXPLANATIONS

Before carrying out an analysis of a reform of the system of national payments, let us deal more in detail with Schmitt's 1984 explanations of investment.

If, on the one hand, it is true that the investment of profit is necessary to increase economy's well-being, the analysis carried out so far also shows that current banking techniques allow demand to be higher than supply, in contrast with the Keynesian identity between global demand (C+I) and global supply (Y). According to Schmitt (1984), in the example studied in Figure 4.2, levels of demand and supply were, respectively, as follows:

demand: 100 m.u. (b) + 20 m.u. (d) + 20 m.u. (c) = 140 m.u.
supply: 100 m.u. (a) + 20 m.u. (c) = 120 m.u.

We shall need to examine the matter more thoroughly.

Since labor lies at the origins of value, national income necessarily amounts to total wages. It is therefore paradoxical to conceive income as the addition of wages and profit. In its foremost reality, the national product is already global and no additional summing is required; the product "comes into being" as an undivided whole; its division logically follows after; put briefly: wages and profit are divisions of income, and not, properly speaking, its elements. The concept is subtle, but clear. Income 'is not made up of "bricks" (separate wages and profit) that precede the building (income); quite the opposite, the building (the product corresponding to labor) is created as a single piece, and its compartments relate to income already formed' (Schmitt 1966: 284, our translation).

To be precise, gross profits are income obtained, through substitution, by firms from those initially entitled to distributed wages. […] However, the part for wage-earners is not identical to the part for nominal wages in the national in-

come. Nominal wages include everything. But wage-earners keep only the income they are able to convert into goods and lose the income intercepted by firms (Schmitt 1966: 295, our translation).

When profits are made out of the buying and selling of products on the goods market, 'then the only capital that can exist turns out to be derived from the transfer of a portion of wages' (Schmitt 1984: 174, our translation) to companies in the form of profit, a flow that is 'simultaneously' present on the labor and goods markets. Profit is a capital that is at once both financial and material, since monetary profit is the financial aspect of a real profit consisting in those products that are stocked by firms, 'to the exact extent that wage incomes are transferred to companies' (Schmitt 1984: 174, our translation).

If profit is distributed to shareholders, it is a temporary capital, which, at the moment of consumption, is transformed back into income, and finally spent on the product market: in this case, income is destroyed and the goods, these having an equal value to the income spent, are no longer stocked by companies. Profit distributed by a company is not necessarily distributed to capitalists, but to any other individual, including workers and that part of society not directly employed. An example might be the families of company shareholders. Also, given that in modern economies corporate gains are taxed, a fraction of company's profit is usually collected by fiscal authorities and distributed to selected recipients, who are entitled to finally spend the proceedings from taxation on the product market. If profit derived at the end of the first period is not invested in a new production, but fully distributed, profit-holders will spend it in the purchase of the stock of goods left unsold in period one: in this case, no capital goods are produced, and income is entirely destroyed. Nevertheless, this case is hypothetical, as companies need profits precisely to invest at least a share of them in the production of capital or instrumental goods: only a portion of profit is invested by the company in the production of capital or investment goods.

Following Schmitt, the value of capital-goods is equal to profit that is invested by the company, i.e. profit that is not spent by shareholders in the purchase of wage goods, but used to pay the wages to workers who produce capital goods. It must be pointed out that the term "capital goods" refers to the economic type of goods, namely a commodity, a machine, any product or service that is produced through the investment of macroeconomic profit, regardless of the physical form and the quantity of the capital goods in question. When profit formed in a period is later invested in the production of capital goods, the value of capital goods will be exactly equal to the amount of that investment. Workers' bank accounts as a whole – including all categories of workers, such as capitalists, managers, craftsmen, etc. – are credited with new wages to the amount of x money units. Wages are then spent by wage-earners to purchase the goods left unsold in the previous period, at cost price, i.e. at a price equal to their value. In this case, invested profit is a fixed capital, no longer temporary: 'financial saving becomes permanent' (Schmitt 1984: 175, our translation). Investment takes place because the new wages are paid 'starting from previous wages intercepted by firms' (Schmitt 1984: 175, our translation). In this case, following Schmitt (1984: 175), although savings are in this case definitive, because capital goods 'finally escape households' consumption', '[t]he bi-univocal relationship of financial capital and physical capital is still fully respected'. The result is the 'coexistence' between saved capital and real capital: '[b]y using Hicks's expression, financial capital is "incorporated" ("embodied")' in capital goods (Schmitt 1984: 175, our translation). This analysis thus coincides with the synthesis formulated by Hicks (1977: 152): 'each capital is a fund (or saving) and matter (or stock)' (Schmitt 1984: 171, our translation).

Suppose, for the sake of simplicity, that profit made in a first period is fully invested in the production of capital goods. Let us modify here the case made up till now, supposing that the wages level in the second period is kept equal to the level of the first period. We suppose that profit to the value of 20 money-units made in the first period finances the payment of the wages corresponding to the production of capital goods and that new wages of 80 money-units are paid following a new production of wage goods.

The total amount of wages paid in the second period to workers is thus of 100 money-units.

Now, in the first period, the cost of production of the goods unsold and stocked in the company is fully covered by profit. The monetary profit of the company coincides with its real profit, i.e. stocked goods. In this case, profit is invested in the temporary purchase of wage goods stocked by the company. In line with previous observations, such investment corresponds to a temporary capital: in fact, the company's purchase of unsold wage goods is not definitive. Corporate profit, in fact, is not distributed as dividend, but rather it is a wage income transferred to the company, i.e. corresponding to a portion of wages initially paid. This portion is temporarily ceded by income earners to the company. Therefore, the portion of workers' income that has become profit is transformed immediately into temporary capital. Indeed, those workers who, in a second phase or period, produce new goods are provided with the accumulated stock of goods. Capital goods correspond to those products that are produced by workers whose wages are paid through profits; the part of goods produced by workers whose wages are paid out starting from a new credit line, instead, are wage goods. By introducing the hypothesis that employment, defined and measured in terms of the level of wages, is kept the same as that of the previous period, households' bank accounts are credited with 100 money-units. Workers employed in the production of wage or consumption goods receive wages amounting to 80 money-units, while workers producing capital goods receive 20 money-units wages. The fact that workers are divided into two categories is not a necessary hypothesis. To make matters clearer, we have hypothesized that some workers produce capital goods, while others produce wage goods. However, in real economies workers' duties are decided according to ability and not according to the typology of goods or services produced on the basis of income type – wages or profit – necessary for the production of given goods or services. Moreover, we should make it clear that our use of the term 'income type' is improper: we speak of 'wages incomes' to mean wages paid starting from a credit line; on the other hand, by 'profit' we mean the part of wages transferred to the company, or set of companies, and which represents

its, or their, income. 80 money-units correspond to the value of new wage goods: the new consumption goods are the real content of the new wages paid out starting from a new line of credit. 20 money-units are instead paid out starting from the profit made in the first period: these wage units are actually a portion of wages initially paid to workers (starting from the initial credit line of 100 m.u.) and correspond, in money, to the stock of goods deposited in the company in the first period. Hence, a twofold payment takes place starting from the same income of 20 m.u. Profits are formed on the product market in period p_0, but are spent on the labor market in a subsequent period, which is symptomatic of a disorder. The money-units resulting from the payment of new wages of 20 m.u. are void of real content (and are accordingly called 'empty money' by Schmitt): the new capital goods will never be purchased by income earners and will never be the real content of wages paid out in the second period to workers employed in the production of capital goods. The reason why capital goods cannot be the real content of new wages is simple. The use or expenditure of corporate income, i.e. profit, in the payment of new wages implies that the company purchases new (capital) goods. This phenomenon was originally described by Schmitt (1984, our translation) as 'depense gigogne', a 'nested spending or outlay'. The purchase of capital goods through the expenditure of profit in the payment of a portion of the new wages allows the company to take the capital goods away from income earners' demand. A capital is thus formed, which is fixed, since it can no longer belong to income earners. This implies that workers' bank accounts have been credited with 20 money-units with no real content. An income of 80 money-units has been created, instead, thanks to the association between money and wage goods, an event that is analogous to the productive process that took place at the beginning of the first period. Starting from new deposits, a new profit can be formed, distributed or invested. Having already studied this process, we suppose that no further profit is formed in period 2.

On the one hand, when profits are redistributed by the company to shareholders, capital-time is transformed into income at the moment it is spent in the purchase of the

goods stocked in the company. Before being redistributed, profit covers the cost of production of wage goods, of which it is the monetary aspect, until they are finally sold.

On the other hand, when profits are invested by the company in the production of capital goods, capital-time becomes fixed capital: households' income is no longer at their disposal, definitively saved for the company's benefit. Instrumental or capital goods are indeed purchased by the company through the investment of profit. When wages are paid thanks to the expenditure of profit, payment does not take place starting from nominal money, but from a company's income: for this reason, i.e. because income is spent in a payment, such expenditure coincides with the company's purchase of instrumental or capital goods. Following Cencini (2015), labor is commanded: since the money paid out to workers has not been 'filled' by any real content, workers have worked exclusively for the good of the company.

If profit is distributed, it is spent on the product market (therefore in the purchase of consumption goods) so that the sum of expenditures on the product market is 'equal to the sum of expenditure' (Schmitt 1984: 213, our translation) on the market for productive services (namely the amount of wages paid for the production of consumption goods). In fact, if, for instance, profits are fully distributed, the expenditure of income amounts to consumption, with no possibility for money payments to be void of real content.

The investment of profit gives rise to a different phenomenon: 'the sum of expenditures on the products market is higher (in an amount equal to investment) than the sum of the corresponding expenditures on the market of productive services' (Schmitt 1984: 213-214, our translation). In the case in which profits are fully invested in the production of capital goods, for instance, recalling the case analyzed so far, the new payment of wages of 20 money-units creates an *excess* demand of the same amount. It would be 'naive to think that investment expenditure is a real addition to consumption' (Schmitt 1984: 210-211, our translation). Investment is indeed an addition of a nominal character, because nominal emissions resulting from net investment are added to 'full' emissions: wages, once converted into invested profit, are an emission of money corre-

sponding to capital goods that will not be "consumed" by income-earners. It is for this reason that Schmitt claims that investment should be a '"catégorie-gigogne" ["nested category"] of consumption', in the same way as profit is a "catégorie-gigogne" of wages. The effect of the emission of nominal money associated to fixed capital is that of 'depriving the set of income earners of the ownership of capital' (Schmitt 1984: 215, our translation). However, as Schmitt (1984: 198) puts it, the net investment of profit creates a "benign" emission of monetary units void of real content, followed by the reabsorption of excess demand. Schmitt states (1984: 192) that two cases of "benign" emission or inflation exist: (i) when bank loans to consumers are in part financed by the simple creation of money and not by pre-existing income; (ii) the net investment of profit in the production of capital goods. In spite of the emission of nominal money void of its real content, when wages are paid through the expenditure of profit, these wages are successively spent by workers to purchase the stock of goods previously left unsold, and deposits are destroyed. Things change radically starting from the following period, when the use of instrumental goods requires fixed capital to be amortized. Subject to wear and tear, and because of obsolescence, instrumental goods must often be replaced. In order for them to be replaced, a production of amortization goods must take place. It is thanks to amortization that the fixed capital level does not decrease in time. As argued by Schmitt (1984), the current structure of national payments is such that amortization reconstitutes the previous capital stock and, simultaneously, increases the value of capital over time. This is at the origin of a 'vicious' inflationary emission. In light of these observations, it must be observed that, given the current structure of payments systems, inflation is brought about by a net investment of profit – in the production of fixed capital – that is pathological in nature. Once bank bookkeeping is adapted to the logical, economic laws of capital formation, investment will take place in a sound way. A reform of national payments systems is thus advocated: records would be kept of the financial relationship between fixed capital and companies – or, generally speaking, society.

Yet one fact is crystal-clear. Today, income-earners create an instrumental capital that escapes them. Fixed capital is definitely purchased, through the expenditure of profit, by a company defined by Schmitt as 'depersonalized', since the *economic* ownership of capital escapes society as a whole. This is clearly a manifestation of a monetary disorder. Companies, in fact, following Cencini and Rossi (2015), should act on behalf of society, they should be an agent designated to the making and management of profit in order to create a capital that belongs to society as a whole. Since every production is the result of labor alone, every production should belong fully to society as a whole. But nowadays capital escapes the economic ownership of society and income earners work to produce it, sacrificing a portion of their income for the benefit of the 'depersonalized' company, an abstract entity: one recalls thereby the enslavement of men to capital theorized by Marx, although it is evident that the class struggle is not the solution to the problem. The economic analysis described so far clearly shows that, in contemporary monetary economies, as stated, in a certain sense, by Kaldor, this division of society into classes is debatable, since it is preferable to analyze income formation and distribution in terms of typologies. Namely wages, income(s), and rents: profits *in primis*.

Now, some authors conceived the *General Theory* as part of a more general theory. See for instance Lange (1938: 12), whose study of the so-called liquidity preference points 'out how both the traditional and Mr. Keynes's theory are but special cases of a more general theory'. As explained by Hamouda (1993: 200): '[a]t first Hicks thought he could reduce the *General Theory* to a special case model of what he believed to be his own general theory, which encompassed all other theories including the classical one'; see also Wood and Woods (1989: 210). On what was defined by Joan Robinson as the problem of 'the generalization of the General Theory', see Robinson 1953, 1956. Pasinetti (2007: 358) calls for the 'resumption' of Keynes's economic theory. In this sense, studies integrating old Keynesian and monetary circuit theories may well have to address employment policies in the near future. Smith (1776 [1981]: 10) 'points out how "the savage nations of hunters and fishers [where] every individual who is able to work is more or less employed in a useful labour […] are so miserably poor […] [while]

among civilized and thriving nations, though a great number of people do not labour at all […] the produce of the whole labour of the society is so great that all are often abundantly supplied"' (Pasinetti 1981: 6). The implication of Smith's reasoning is straightforward: considerations on employment policies (i) should be done on the basis of the wealth *created* in an economy and *distributed* to the population, and (ii) attribute less importance to *demographic* magnitudes. What we infer from our previous analysis is the need of a functional relationship between banks and firms for the creation of net value. In an economy where wage-goods and capital-goods are created, the population is provided with the income necessary to purchase the totality of production. The tool of double-entry bookkeeping triggered the development, after the Renaissance, of industry. The role of industry and banks is to guarantee the division of labor and the monetization of production without which production would be of a purely physical nature. We endorse the idea (see for instance Pasinetti 1981: 2) that the phase of industry presupposes trade, but it more than anything presupposes banking activities. The advanced phase of trade is no exception. The analysis conducted above implicitly confirms that firms' access to bank credit is crucial for sustainable economic growth.

Now, as Keynes (1936 [1964]: 18) puts it: 'classical economists have thought that supply creates its own demand; - meaning by this […] that the whole of the costs of production must necessarily be spent in the aggregate […] on purchasing the product'. The analysis carried out so far sheds light on this classical conception. Yet, in modern capitalist economies, mass unemployment is a recurring burden in capitalist societies: '[t]here are machines, and there are workers able to man them, but they all remain idle for lack of effective demand' (Pasinetti 1974: 33). It seems to us that the current system of national payments, by confusing distributive and production-based transactions, leads to the 'breaking of the causal link between the demand for goods and the supply of labour' (Bradley 2003: 405).

The global financial crisis that began in 2007 is no exception. The crisis might have been brought about by errors in regulations and a high-risk attitude of financial actors. However, the problem is complex and there is as yet no consensus of opinion as

to an explanation of the causes of the crisis, which began in 2007-8 in North America and Europe. Real estate values in the USA collapsed in 2007. This was the beginning of the 2007 Global Financial Crisis (see Lavoie 2014: 1). In 2008, Freddie Mac and Fannie Mae were bailed out by the United States Government, and certain banks, such as Washington Mutual and Wachovia, were saved through State acquisition. The insurer AIG was bailed out by the US Government. The bankrupt of Lehman Brothers, in September 2008, proved to be the most disastrous event. In an era of financial market globalization, the crisis soon spread to Europe as well. One of the key problems for certain European economies (the so-called PIIGS) was the high ratio of debt/GDP. During the months that followed, American and European banks made significant reductions in lines of credit to companies and loans to families. The Canadian and US governments considered it necessary to bail out General Motors. It seems that the global demand of products and services (in terms of money-income) may be insufficient with respect to their global supply (in terms of cost of production). Otherwise said, the growth rate of capital accumulation could have slowed down due to the insufficiency of global demand for products and services compared to their global supply. This concept is called a *savings glut* or, alternatively, overproduction and under-consumption. The idea is not new (see Birck 1927; Keynes 1930, 1936).

It would be worth studying, in future academic works, the explanations of the divergence between demand and supply in modern economies given by the General Theory and the circuit theory, namely Keynes's 'psychological arguments like the excessive thriftiness of income-earners or the timorous attitude of investors' (*ibid.*) versus the role played in Schmitt's analysis by amortization. According to Keynes (1932 [1979]: 52), '[t]here is a half-way house, which permits the existence of unemployment in the short period'. Following Solow (2012: 268), Keynes also argues that 'a modern economy could be in equilibrium with unemployment, meaning that there were no internal forces at all tending to move it out of that state', although '[m]ost modern economists […] think that Keynes did not quite make good' on that assertion (*ibid.*). The monetary analysis of amortization possibly shuffles off any doubts. In fact, accord-

ing to Schmitt, monetary disorders are likely to emerge when the replacement of capital-goods takes place: as Bradley (2003: 405) puts it, current economic systems face 'a reduction in the rate of profit that will in its turn lead to the decline of productive investment in favor of purely financial operations, this tendency being accompanied by soaring unemployment'. Hence, a line of inquiry should deal with a meticulous investigation into the formation of amortization-goods and its implications on the real and nominal aspects of aggregate demand and aggregate supply.

There is no doubt that capital is indispensable in modern economies, since it increases the values-in-use and hence the material wealth of society as a whole. Avoiding that monetary capital is taken out of society's hands becomes the goal of normative analysis.

A REFORM OF THE SYSTEM OF NATIONAL PAYMENTS

Normative or welfare economics has been the subject of study of neoclassical, traditional economics. As Mishan (1981: 3) puts it, '[n]ormative […] economics can be defined as the study of criteria for ranking alternative economic situations on the scale of better or worse', and it 'implies "ought" propositions that derive ultimately from the ethics of society', being its purposes, for instance, those of reaching 'high employment levels', guaranteeing 'the free movement of goods and factors', and pursuing 'economic and social stability'. The ethical or subjective essence of so-conceived normative economics, following Mishan (1981: 14), has met 'popular', widespread resistance, since normative propositions are not 'generally valid', and, '[w]orse still, […] all proposed tests of welfare improvements can be shown to be self-contradictory'. As a matter of fact, regardless of the internal consistency and generality of every normative proposition, its subject is asserted to be 'misleading and unnecessary. It is *misleading* because […] the economist would be making recommendations that depend ultimately upon his own value judgments […] as if they were scientific conclusions of his detached investigations. […] The subject is said to be *unnecessary* because we can leave all decisions on economic policy to the political process itself' (Mishan 1981: 15). It is worth making an issue of this argumentation. We observe that, on the one hand, a large number of economists, mainly neoclassical, builds a normative economic theory that consists in 'optimal' decisions taken on the basis of subjective criteria. On the other hand, another tradition of economic thought, namely the classical, the Keynesian, and the "circuitist" schools, though still explaining economics by giving importance to individual, subjective, behavior, looks for objective, deductive criteria on which normative economics, conceived as the set of technical rules implementing real economic systems, should be founded. We argue that in both cases, borrowing Mishan's words (1981: 22), 'normative economics must have recourse to the analysis and findings of positive economics. For it is not possible to prescribe what should be done unless we have clear ideas about what would happen if certain economic measures were undertaken or withdrawn'. On

the one hand, traditional neoclassical normative economics is founded on positive subjective considerations, whereas on the other hand classical, Keynesian, and "circuitist" normative economics is built on positive objective observations.

The monetary circuit theory developed here foresees a need to introduce a subdivision into three banking departments that relate to the logical subdivisions between money, income and fixed capital. Thus, the three departments are respectively those for money (Department I), income (Department II or Saving Department), and investment (Department III or Fixed Capital Department). As the accounting period between one balance and the next, we shall take the calendar month (by assumption, wages are paid monthly). For simplicity's sake, we shall set aside other intermediate entries for the money and income departments, focusing exclusively on the payment of wages. We shall therefore record entries in Department I relating exclusively to the payment of wages in the first and second periods. Money is the means for all transactions, including the initial transaction in which income is formed. 'Distinguishing between money and savings departments helps to avoid the risk of monetary creation financing loans, allowing bank operators to be aware, at any given moment, of the amount of income that may be lent' (Cencini 2015: 240, our translation). Let us repeat it once more. The Money Department is needed to avoid inflation's advent, since it prevents money creation (void of any real content) to finance loans (purchases) to bank clients. Record of deposits is kept instead in the Income or Financial Department. Money, full of real content, is registered as a temporal capital that constitutes income-holders' credit toward the bank. Otherwise said, once income is formed, it is registered within the bank system and remains temporally available in the financial market. Whenever consumers decide to purchase goods and services, a portion of income will be spent on the products market, and deposits will be thus destroyed for the same amount. It is in the Fixed Capital Department, instead, that the incomes invested in the production of capital goods are recorded – as company's credits toward the bank. In particular, this department impedes invested profit from being available on the financial market. Profit, once made by the company, is always registered in this department. Only invested profit is

definitively fixed into it, though. The portion of profit that is distributed as dividends or paid as interest leaves Department III, and is again available in Department II. This meaning that dividends and interest are again converted into income that, available on the financial market, will be spent on the products market.

Income creation and expenditure

Let us proceed step by step. Table 4.3 gives the entries (in the first and second departments) relating to a simple case in which wages are entirely paid and spent (i) before the closure of the accounting period (that is, a month, if wages are paid monthly as in our numerical example) and (ii) without profit being distributed to the company. The first two entries (1 e 2) concern the creation of workers' income (*W* stands for 'workers'). Wages payment entails the creation of 100 m.u., registered on the assets side of the money department, and 100 m.u. income on the liabilities side of the Saving (or Income) Department. Meanwhile, the Money Department and the Saving Department are debited-credited between each other. The two following entries (3 and 4) concern instead the definitive expenditure of income. The payment of income-holders is registered within the assets of the Saving Department, while the company's credit is registered on the liabilities side of the Money Department. At the same time, the Saving Department and the Money Department are debited-credited between each other. This allows for the settlement of the dual debit-credit relationship between the company and income-earners. Money and income are hence destroyed (balances 5 and 6).

TABLE 4.3 *Income creation and total expenditure: bookkeeping*

Banks B

Money department (I)

Assets			Liabilities	
(1) F	100 m.u.	Saving department (II)		100 m.u.
(4) Saving department (II)	100 m.u.	F		100 m.u.
(5)	0 m.u.			0 m.u.

Banks B

Saving department (II)

Assets			Liabilities	
(2) Money department (I)	100 m.u.	W		100 m.u.
(3) W	100 m.u.	Money department (I)		100 m.u.
(6)	0 m.u.			0 m.u.

Source: *author's elaboration from Cencini and Rossi (2015).*

Entries in Table 4.4 concern a case similar to the preceding one, in which income is not entirely spent before the end of the accounting period. Supposing that workers have spent 60% of their wages, without profit creation having taken place, payments for the two departments indicate a persistent company debt of 40 m.u., workers' credit for the same amount, and credit-debit for the two departments equal to 40 m.u. The first four entries are similar to the first four in the previous case. The balances, however, differ. In fact, the new balances of the two departments (entries 5 and 6) show that, out of initial income, a 40 m.u. income has not been destroyed yet. Transactions from 7 to 10 show that, in the current practice, income lasts over time, in the form of a capital, up to the moment of its final expenditure.

TABLE 4.4 *Income creation and partial expenditure: bookkeeping*

Banks B			
Money department (I)			
Assets			*Liabilities*
(1) F	100 m.u.	Saving department (II)	100 m.u.
(4) Saving department (II)	60 m.u.	F	60 m.u.
(5) F	40 m.u.	Saving department (II)	40 m.u.
(8) Saving department (II)	40 m.u.	F	40 m.u.
(9)	0 m.u.		0 m.u.

Banks B			
Saving department (II)			
Assets			*Liabilities*
(2) Money department (I)	100 m.u.	W	100 m.u.
(3) W	60 m.u.	Money department (I)	60 m.u.
(6) Money department (I)	40 m.u.	W	40 m.u.
(7) F	40 m.u.	Money department (I)	40 m.u
(10) F	40 m.u.	W	40 m.u.

Source: *author's elaboration from Cencini and Rossi (2015).*

We note that the entries studied in the two preceding cases do not involve the fixed capital department: entries in this department take place only for profit formation,

the payment of dividends and those for interest, and the formation of working or in-
strumental capital. The next sections show the role of the fixed capital department in the
process of capital formation.

Profit and dividends

We shall study now profit formation and its distribution to shareholders. We consider
the entries in the Money Department concerning the payment of wages only. For the
sake of exposition, we shall simplify the entries shown in the previous section. We shall
focus on those transactions that involve the Saving and the Fixed Capital Departments.
Entries from (1) to (6) concern the payment of wages. Wages payment implies the
creation of 100 m.u. and an income of the same amount: as previously observed, this
implies the debit-credit of the first two departments (entries 1 and 2).

<div align="center">

Banks B

Money department (I)

</div>

Assets			*Liabilities*
(1) F	100 m.u.	Saving department (II)	100 m.u.

<div align="center">

Banks B

Saving department (II)

</div>

Assets			*Liabilities*
(2) Money department (I)	100 m.u.	W	100 m.u.

Let us suppose that, by the end of the accounting period, wages are not spent yet: saved up income is lent to firms, which invest it in the formation of a stock. This means that the relationship between the two departments ceases to exist (entries 3 and 4).

Banks B

Saving department (II)

Assets		Liabilities	
(3) F	100 m.u.	Money department (I)	100 m.u.

Banks B

Money department (I)

Assets		Liabilities	
(4) Saving department (II)	100 m.u.	F	100 m.u.

The balance of the first department is null, since income is entirely spent in the formation of a stock; the balance of the Saving Department amounts instead to 100 m.u. (entries 5 and 6).

Balance I

Banks B

Money department (I)

Assets		Liabilities	
(5)	0 m.u.		0 m.u.

Balance II

Banks B	
Saving department (II)	
Assets	*Liabilities*
(6) F 100 m.u.	W 100 m.u.

Now, let us analyze the spending of wages and profit formation. We will omit entries relative to the Money Department, for the sake of simplicity. Entry (7) regards the debit-credit of income-holders and the company in the financial book (Department II) of the bank. This entry is important for two reasons. First of all, it shows a 80 m.u.-income expenditure for the final purchase of a goods stock valued at the same amount. Further, this entry shows a company profit of 20 m.u.

Banks B	
Saving department (II)	
Assets	*Liabilities*
(7) W 100 m.u.	F 80 + 20 m.u.

Entry (8), which is the Saving Department balance, shows the existence of company deposits (entered as a liability in the bank financial book) and the existence of a real stock stored in the company (registered as an asset in the same book).

Balance II

Banks B			
Saving department (II)			
Assets			*Liabilities*
(8) Product	20 m.u.	F	20 m.u.

A new department must come now to the fore. In fact, profit has to be recorded in Department III. However, we are still unaware of whether it will be invested entirely or whether it will be at least partially distributed. The deposit of profit in a proper department implies mutual entries (9 and 10) in both the Saving and the Fixed Capital Department.

Banks B			
Saving department (II)			
Assets			*Liabilities*
(9) F	20 m.u.	Fixed capital department (III)	20 m.u.

Banks B			
Fixed capital department (III)			
Assets			*Liabilities*
(10) Saving department (II)	20 m.u.	F	20 m.u.

The balance of the second department is thus as follows (entry 11):

	Banks B		
	Saving department (II)		
Assets			*Liabilities*
(11) Product	20 m.u.	Fixed capital department (III)	20 m.u.

    Let us suppose shareholders receive dividends for 5 m.u. It is therefore neces-
sary to credit shareholders (financial department) and subtract the 5 m.u. corresponding
to dividends from Department III. Entry (12) regards the financial department:

	Banks B		
	Saving department (II)		
Assets			*Liabilities*
(12) Fixed capital department (III)	5 m.u.	Shareholders	5 m.u.

The entry (13) for Department III is immediately:

	Banks B		
	Fixed capital department (III)		
Assets			*Liabilities*
(13) F	5 m.u.	Saving department (II)	5 m.u.

Profit, initially amounting to 20 m.u., has been partially distributed to shareholders, whose deposits have hence increased by 5 m.u. They will spend dividends in purchasing a fraction of the stock (valued at 5 m.u.) stored in the company. Profit reduction is equivalent to an increase in households' deposits for an equal amount. The balance for the third department is therefore (entry 14):

Banks B

Fixed capital department (III)

Assets			Liabilities
(14) Saving department (II)	15 m.u.	F	15 m.u.

The available profit for investment in the production of capital goods or fixed capital is therefore equivalent to 15 m.u.

Now, if shareholders spend dividends in the purchase of unsold goods to a value of 5 m.u., we record (entry 15):

Banks B

Saving department (II)

Assets			Liabilities
(15) Shareholders	5 m.u.	Product	5 m.u.

Shareholders' spending implies a destruction of income. The balance for Department II is thus (entry 16):

Banks B

Saving department (II)

Assets			*Liabilities*
(16) Product	15 m.u.	Fixed capital department (III)	15 m.u.

The balance for the financial department shows that, in the economy, the product left unsold and stored in the company has a value of 15 m.u. Company's profit is recorded in Department III.

In Table 4.5, we give the whole set of entries registered in the first period.

TABLE 4.5 *Profit and dividends: bookkeeping*

Banks B

Money department (I)

Assets			*Liabilities*
(1) F	100 m.u.	Saving department (II)	100 m.u.
(4) Saving department (II)	100 m.u.	F	100 m.u.
(5)	0 m.u.		0 m.u.

Banks B

Saving department (II)

Assets			*Liabilities*
(2) Money department (I)	100 m.u.	W	100 m.u.

(3)	F	100 m.u.	Money department (I)	100 m.u.
(6)	F	100 m.u.	W	100 m.u.
(7)	W	100 m.u.	F	20+80 m.u.
(8)	Product	20 m.u.	F	20 m.u.
(9)	F	20 m.u.	Fixed capital department (III)	20 m.u.
(11)	Product	20 m.u.	Fixed capital department (III)	20 m.u.
(12)	Capital department (III)	5 m.u.	Shareholders	5 m.u.
(15)	Shareholders	5 m.u.	Product	5 m.u.
(16)	Product	15 m.u.	Fixed capital department (III)	15 m.u.

Banks B

Fixed capital department (III)

Assets		*Liabilities*	
(10) Saving department (II)	20 m.u.	F	20 m.u.
(13) F	5 m.u.	Saving department (II)	5 m.u.
(14) Saving department (II)	15 m.u.	F	15 m.u.

Source: *author's elaboration from Cencini and Rossi (2015).*

We have so far described accounting entries relative to the first period. We shall now proceed with an analysis of entries in the second period, during which the profit of 15 m.u. is invested by the company: the payment of new wages takes place and, through the expenditure of wages, income-owners are able to acquire unsold goods from the first

period, stored in the company and with a value of 15 m.u. At the end of the second period, the company will simultaneously be debited for income and credited with fixed capital.

Investment

The Money Department is always involved – i.e. whenever a payment takes place –, money being always created and immediately destroyed. As previously stated, in this study, we chose to consider entries in Department I just as far as wage payments are concerned. Profit investment falls into such a type of payment. Let us study now profit investment. Entries (17) and (18) are related to the new payment of wages, amounting to 15 m.u. The first two departments are thus involved in monetary and financial transactions.

Banks B

Money department (I)

Assets		*Liabilities*
(17) F	15 m.u.	Saving department (II) 15 m.u.

Banks B

Saving department (II)

Assets		*Liabilities*
(18) Money department (I)	15 m.u.	W 15 m.u.

Supposing that the spending for new wages is for the moment null, at the end of the accounting period we will have the following entries (19 and 20) in the money and income departments, since money does not survive the accounting period.

Banks B

Saving department (II)

Assets		Liabilities	
(19) F	15 m.u.	Money department (I)	15 m.u.

Banks B

Money department (I)

Assets		Liabilities	
(20) Saving department (II)	15 m.u.	F	15 m.u.

The balance for the first department at the end of the second accounting period is null (entry 21):

Balance I

Banks B

Money department (I)

Assets		Liabilities	
(21)	0 m.u.	F	0 m.u.

Income still survives. To be precise, in the form of capital, as a temporal capital that will be finally spent as soon as consumption will be effective. Hence, the balance of the saving department is as follows (entries 22a-22b).

<div align="center">Balance II</div>

<div align="center">Banks B</div>

<div align="center">Saving department (II)</div>

Assets			*Liabilities*
(22a) Product	15 m.u.	Fixed capital department	15 m.u.
(22b) F	15 m.u.	W	15 m.u.

The spending of new wages in the acquisition of the product left unsold at the end of the first period is recorded as follows (entry 23).

<div align="center">Banks B</div>

<div align="center">Saving department (II)</div>

Assets			*Liabilities*
(23) W	15 m.u.	Product	15 m.u.

The final balance for the second department is therefore (entry 24):

Banks B		
Assets Saving department (II)		*Liabilities*
(24) F	15 m.u.	Fixed capital department (III) 15 m.u.

At the end of the second period, there is no longer any consumption good stored in the company and the fixed capital is not lost to society.

In Table 4.6, we give the complete sequence of accounting entries for the second period.

TABLE 4.6 *Investment: bookkeeping*

Banks B		
Assets Money department (I)		*Liabilities*
(17) F	15 m.u.	Saving department (II) 15 m.u.
(20) Saving department (II)	15 m.u.	F 15 m.u.
(21)	0 m.u.	0 m.u.

Banks B		
Assets Saving department (II)		*Liabilities*
(16) Product	15 m.u.	Fixed capital department (III) 15 m.u.

(18) Money department (I)	15 m.u.	W	15 m.u.
(19) F	15 m.u	Money department (I)	15 m.u.
(22a) Product	15 m.u.	Fixed capital department (III)	15 m.u.
(22b) F	15 m.u.	W	15 m.u.
(23) W	15 m.u.	Product	15 m.u.
(24) F	15 m.u.	Fixed capital department (III)	15 m.u.

Source: *author's elaboration from Cencini and Rossi (2015).*

The balances of the three departments for the two periods are shown in Table 4.7.

TABLE 4.7 *The periods' balances: bookkeeping*

Banks B

Money department (I)

Assets			*Liabilities*
(21)	0 m.u.		0 m.u.

Banks B

Saving department (II)

Assets			*Liabilities*
(24) F	15 m.u.	Fixed capital department (III)	15 m.u.

	Banks B	
	Fixed capital department (III)	
Assets		*Liabilities*
(14) Saving department (II)	15 m.u.	F	15 m.u.

Source: *author's elaboration from Cencini and Rossi (2015).*

Instrumental capital has now a monetary counterpart that is fixed in bank's accounts, at societal disposal. Also, ordinary activities such as amortization will be carried out in an orderly way.

Conclusion

Economic theory can be said to have evolved following three lines of thought. Classical authors paid attention to the laws governing the determination of output value: production was the sphere in which, according to them, monetary or absolute values of goods are determined, the same being equally true of prices. Neoclassical writers approached value and price by focusing, instead, on the circulation of goods, namely on the exchange phase: it is in this context that monetary values and relative prices would be determined. It was Keynes who overtly tried to reject classical and neoclassical theories of value, by acknowledging the role played by money in modern economies of production.

Classical and neoclassical theories have always been characterized by the dichotomy between monetary and real magnitudes. According to the (neo)classical dichotomy, money is a means of exchanging physical goods between each other. Further, changes in money levels would play no role in determining real economic activities. That is, productive activities and unemployment are never made to depend on the process of money creation. The extreme consequence of the tendency to conceive of money and products as dichotomist is to be found in all theories based on general economic equilibrium: money is nothing more than a physical asset, a commodity strictly speaking, that adds to all products. To be true, money, although basically conceived of as a commodity, was also considered by the Classicals as having specific attributes of its own, which are not shared by physical goods. Searching for a unit of measure of output value, Smith, Ricardo, Say, and Marx inevitably formulated different theories about the nature of money. Despite a long-standing debate on this issue, none

of them was able to advance a clear and universally shared answer to the matter at hand. Walras' identification of money with the *numéraire*, a standard used to measure products value, was a remarkable attempt to acknowledge money's centrality in economic systems. Still, Walrasian theory is for sure the one according to which the dichotomy between monetary and real magnitudes took root most.

The modern theoretical developments of economic theory took place mostly since the 'Forties of the twentieth century, toward what was defined by Keynes as a monetary theory of production, namely a theory encompassing both monetary and real aspects of economic reality. As soon as one observes that bank money is central to modern economies of production, it is crystal-clear that money is essential to productive (and consumption) activities. In fact, money creation and its integration with output allows for the monetization of goods and services that, in the absence of money, would be characterized by the sole physical heterogeneity. Therefore, it is thanks to money creation and integration that physical products are made homogeneous, economic products. It is thanks to money destruction, further, that homogeneous, economic products become, once again, heterogeneous, physical products. Thus, money builds a temporary bridge between production and consumption. Borrowing Keynes's words (1936: Book V), we would state that money matters for its being a bridge between current and future economic activities. Once wages are paid, wage income is deposited in bank accounts in the guise of a temporary, monetary capital and, simultaneously, as a physical stock within companies; as soon as wages are finally spent, income is definitively destroyed, this meaning that, whereas monetary deposits are nullified, the real product has a value-in-use from which the entire society does benefit. Being money the numerical form of goods and services, it cannot be conceived of as a commodity. Neither can money and output be two separated magnitudes, for they in fact are two faces of the same reality. As grasped by classical authors, money has numerical attributes and, for this reason, money does not add to real output. The monetary theory of production thus becomes a unitary theory of money and output: thanks to the union of

form and matter, the classical and neoclassical dichotomy between real and monetary magnitudes is overcome.

The payment of wages is an instantaneous event that embraces, in a flux-reflux, back and forward, the continuous time of physical production. In economics, production and output are then the terms of an identity that is always true independently of time. It is in this context that a thorough understanding of wages takes place. In fact, wages are a positive emission and a negative emission, respectively, on the labor and on the products market; on the financial market, wages are simultaneously positive and negative. Far from being a mere tautology, the relationship between demand (deposits) and supply (real output) cannot be read as an equality but as an identity. Thus, Keynes's identity between income and production acquires new significance. What really allows for the temporary existence of monetary and real deposits is money.

> [I]ncome is not destroyed at the moment of its formation, but later; income destruction and income formation do not coincide in chronological time. How, then, can we explain the interposition of positive duration between income formation and expenditure? The theory offers only one answer, which is that the existence of positive time between the formation and expenditure of incomes is identical to the existence of money between production and consumption: time is money (Schmitt 1986: 126).

As soon as it is ascertained that labor is the sole factor of production, output value is objectively identified with wages. How can one then explain profit formation? Studied within production *or* exchange only, profit can be physical *or* monetary. It is only once both production *and* exchange are studied as part of a single, coherent framework that profit can be said to be, instead, both physical *and* monetary. Profit, at the macroeconomic level, turns out to be positive. In particular, it is a substitution income that forms thanks to the distribution of a fraction of wages to companies' depos-

its. Accordingly, profit investment can be studied from both a real and a monetary viewpoints as well.

Although economics has often been described as the "dismal science" (according to Carlyle's 1849 epithet), from the analysis carried out in this work, macroeconomics, in a teleological sense, can be said to be an exact science, for few and precise are the laws governing monetary systems of production. Economic theory must precisely detect such laws, according to which individuals' income is formed, distributed, invested, and destroyed. Once the monetization of the product is understood, the distribution of income (as profits, dividends, rents, interests, etc.) and its investment in the production of fixed capital can be fully investigated. One then realizes that the payment of wages allows for the creation of a (real and monetary) income that is a mathematical set: however small or big, this set is macroeconomic in nature, for it is a net product that modifies the overall income level in a given national economy. The macroeconomic nature of all sets is not given by their aggregation, but by the fact that each of them is a macroeconomic entity. The inductive method is used in natural sciences, where experiments are made in laboratories. Economics cannot be developed in laboratories. A different kind of inductive method must be adopted in economics: once the economist has observed reality, he must abandon himself to logical reasoning. As soon as it has been observed that productive economies are monetary in nature, thanks to a chain of logical propositions, a new, internally-coherent economic theory is brought about. Once macroeconomic laws are fully understood, positive theory must detect whether the modern bank systems function in full accordance with such laws, and, if need be, develop policy advice.

Once macroeconomic laws are known, the origins of disequilibria in the national economy, manifest in inflation and unemployment, can be studied, the remedy being implicit in the theory itself. Economics is thus both positive and normative; the norm is given in the logical development of the analysis. […] Economics […] is "self-contained" (Schmitt 1986: 130).

Following the analysis of income distribution and investment, one discovers that a reform of national payments systems is urged. In particular, a reform based on bank bookkeeping practice must be implemented in order to fully keep a record of money, income, and fixed capital levels, allowing for a strict distinction between distributive payments and those transactions that, instead, are at the origin of new income. If one wants to preserve the current institutional order, as well as create a sound capitalism devoid of monetary disorders, it might be humbly affirmed that no option other than a reform of national payments systems can be carried out in the near future.

Appendix

MARX'S THEORY OF PROFIT: A REJECTION

Marx's profit theory is a theory of the determination of surplus value, which is to say, a theory that attempts to explain profit formation in a capitalist economy. Marx (1867 [1982]: vol. I) seeks to explain what Ricardo took for granted: in fact, in the eyes of Marx, Ricardo believed that profit was 'inherent' in the capitalist productive process, but he took no pains to explain its origin fully. The capitalist system, for Ricardo, was a 'natural system of production', while for Marx it was an intermediate system, transitory, between the feudal system and a possible future Socialist system (see Pasinetti 1981: 11-14). Just as with Marx's theory, Ricardian theory was based on the idea that profit was derived from the 'productive workforce' (ibid.). This is not the only similarity between the theories of the two classical economists. In fact, according to a 'conventional view', following Wood (1975: 11-12), for both Ricardo and Marx profit would be a residual between output per capita and the subsistence wage (see, for example, Kaldor, 1956; Robinson 1942; Cencini and Schmitt 1977). This interpretation of Marx's Capital is not the only one to be found in economic literature (see, for instance, Wood 1975).

In Marx's profit theory, capital initially lies at the origin of surplus value. Let us understand this concept better. According to Marx (1867 [1982]: 317, I), capital is at first subdivided into two parts. The first part is made up of the 'means of production, i.e. the raw material, the auxiliary material and the instruments of labour', whose value is invariable and which is defined as 'constant capital'. A second part, instead, is represented by labor power, with a variable value, for which it is defined as 'variable capital'. Following Garegnani (1960 [1972]: 43), the variable part of what Marx termed capital

consists of wage goods, while the constant part consists of capital goods prior to the productive process. Constant capital, 'c', corresponds to money 'spent through production', while variable capital, 'v', consists of money spent on labor power: 'c represents the portion of value which has been turned into constant capital, v that turned into variable capital' (Marx 1867 [1982]: 320, I). Capital is therefore represented symbolically by the formula: $C = c + v$. Moreover, Marx states that surplus value originates from variable capital. When profit formation has taken place, capital comprises a constant part, a variable part, and profit. The preceding expression is transformed into $C'=(c+v)+p$, for which reason C becomes C' (1867 [1982]: 321, I). According to Marx, profit has a double nature: it originates from capital and it feeds it. We shall analyze the issues raised in the problem.

Marx's enquiry consists of a study of the way in which profit is formed and, to a lesser extent, how it is realized monetarily. During his enquiry, Marx challenges those theories proposing that the origin of profit lies in the difference between prices and values of goods. Marx especially has no belief in the possibility that surplus value can be explained by the fact that goods may be sold at a price higher than their value, or bought at a price lower than this. According to Marx, the exchange of goods does not give rise to profit, but rather to the distribution of the value of the commodities. To support his belief, he gives the following example.

> A sells wine worth £40 to B, and obtains from him in exchange corn to the value of £50. A has converted his £40 into £50, has made more money out of less, and has transformed his commodities into capital. Let us examine this a little more closely. Before the exchange we had £40 of wine in the hands of A, and £50 worth of corn in those of B, a total value of £90. After the exchange we still have the same total value of £90. The value in circulation has not increased by one iota; all that has changed is its distribution between A and B (Marx 1867 [1982]: 265, I).

Challenging the possibility that profit arises from exchange, Marx therefore wonders whether its formation should be sought out at another level. Indeed, Marx writes: '[w]e have shown that surplus-value cannot arise from circulation […]. But can surplus-value originate anywhere else than in circulation […] ?' (Marx 1867 [1982]: 268, I).

Adam Smith believes that profit or surplus value are created through an exchange of goods. The subdivision into wages and profit, a concept taken by Marx from Ricardo, is instead explained at another level, being that of production. Further on, we shall attempt a critical explanation of the issues involved in this question. We shall follow here the critical assessment that was brilliantly developed by Cencini and Schmitt (1977). What makes it impossible for profit to form during an exchange between equivalents is the imposition of the law of exchange, being that heterogeneous goods and services may be exchanged only if they have an equal value: 'it follows that prices cannot differ from value; they constitute its monetary representation' (Cencini and Schmitt 1977: 14, our translation). As Marx writes (1867 [1982]: Ch. I, I), the equality between the expressions of value of exchanged commodities was discovered by Aristotle. It is Marx himself, as noted by Cencini and Schmitt (1977), who writes this explicitly: '[p]rice, taken by itself, is nothing but the *monetary expression of value*. […] Looking somewhat closer into the monetary expression of value, or what comes to the same, the conversion of value into price, you will find that it is a process by which you give to the *values* of all commodities an *independent* and *homogeneous form*' (Marx 1898 [1969]: 16). Therefore, the direct consequence of the law of exchanges is that profit cannot be derived during circulation, since 'no global positive difference may appear between values exchanged' (Cencini and Schmitt 1977: 15, our translation).

Thus, Marx challenges the idea that profit has an origin in exchange and realizes that profit forms thanks to production: 'the appropriation of surplus value is an act that takes place within the production process' (Cencini and Schmitt 1977: 20, our translation). Marx understands the impossibility that different types of productive or creative factors for value can exist, such as, for example, land, capital and labor: as Cencini and Schmitt (Cencini and Schmitt 1977: 15, our translation) explain, Marx is fully aware

that 'the influence' of these factors 'is exercised on the physical productivity of labour; it determines the quantity of merchandise produced and not its value'. Having discarded the hypothesis that productive factors are of different types, it follows that the sole creating factor for value is human labor: it is therefore labor that lies, for Marx, at the origin of the fraction of the total value corresponding to surplus value or profit (Cencini and Schmitt 1977: 15, our translation).

Immediately, however, the problem arises of 'finding the means of producing a quantity of merchandise whose measure is greater than the wages distributed' to workers as a group (Cencini and Schmitt 1977: 13, our translation): Marx wonders how it is possible that, through production, labor creates a total value that may be subdivided into wages and profit (Cencini and Schmitt 1977: 16.

Now, in order for profits not to be null, wages must correspond to a part of the total value, the remaining part being equal to profit. Such a division of the product into wages and profit 'is permitted by the introduction of a specific commodity, labour power' (Cencini and Schmitt 1977: 16, our translation). Marx defines labor power as 'those mental and physical capabilities existing in the physical form, the living personality, of a human being, capabilities which he sets in motion whenever he produces a use-value of any kind' (Marx 1867 [1982]: 271, I).

Labor power, one of the most famous concepts in Marx's theory of value, is identified as a particular commodity sold by each worker in exchange for a wage and which, like all other commodities, is subject to the law of exchange between equivalents. In fact, labor force and wages must be exchanged using a common measure. Marx concludes that the measure common to labor force and wages, and which allows for their exchange, is the labor socially necessary to produce the labor force. It should further be noted that for Marx, as Cencini and Schmitt put it, 'the exchange between equivalents imposes a subdivision of the product prior to its monetary realization': Marx in fact writes that '[t]he value of a commodity is expressed in its price before it enters into circulation, and it is therefore a pre-condition of circulation, not its result' (Marx 1867 [1982]: 260, I).

Therefore, surplus value or profit is identified by Marx as the 'difference between the measure of the product and the measure of the labour force; that is to say, it is formed from the difference between total labour and labour absorbed by wages' (Cencini and Schmitt 1977: 20, our translation). Since wages represent that part of the total product destined for workers, surplus value is that part of the total product that belongs to the capitalists, and 'this appropriation is permitted by the particular nature of the labour force commodity' (Cencini and Schmitt 1977: 19, our translation).

Now, according to Marx's analysis, capitalists appropriate a profit or surplus value that consists of real goods ceded without payment to the workers. As Cencini and Schmitt note (1977: 31), Marx himself took the question of profit to a different level by realizing that such profit must be sold and therefore monetized: '[t]hus the question is not: where does surplus-value come from? But rather: where does the money come from which it is turned into?' (Marx 1867 [1982]: 404, II). In Marx's theory, the monetary realization of profit, taking place through exchange, is necessary so as to give a monetary form to commodity profit, this being formed during production: '[t]his transformation of surplus-value from its original commodity form into money must now be investigated further' (Marx 1867 [1982]: 400, II). As noted by Cencini and Schmitt (1977: 32), Marx could not have been clearer on this point: surplus value is produced during the productive process, its realization being possible during the exchange or circulation phases. Money is the general equivalent that permits the exchange of goods in any capitalist system, since without it the homogenization of heterogeneous goods, and therefore their exchange, could not take place. Production economies would return to a primitive state of bartering, with all its associated difficulties: 'commodities are rendered commensurable and can be exchanged on the basis of their monetary measure' (Cencini and Schmitt 1977: 33, our translation). It is thus necessary to explain in what way the surplus might be monetized and to establish whether Marx's explanation is internally consistent.

The sale of commodities in exchange for money in a process that exchanges produced goods, P, for money, M (process P-M), requires a monetary income to exist

that is the measure of the product. This monetary income must necessarily originate from production, but in what way? 'Workers are able to acquire a part of the product, the measure of which corresponds to wages' (Cencini and Schmitt 1977: 35, our translation). It is Marx himself who specifies that money functions 'in the hands of the worker as the money form of his wage, […] i.e. as the money form of the revenue that he receives from the ever repeated sale of his labour-power' (Marx 1867 [1982]: 515, II). It is clear that the expenditure of wages implies that workers acquire a part of the product: the part that, following Marx's reasoning, does not correspond to profit (Cencini and Schmitt 1977: 36, our translation). With the (final) spending of workers' monetary income, their income passes into the hands of companies or capitalists: the variable capital of companies is transformed into money via commodity. Inevitably, as Marx himself observes, following Adam Smith's intuition, the concept of money-commodity implies that during the two phases of acquisition and sale (P-M-P) 'circulation separates into two acts of bartering. P-M: commodity exchange value is expressed by another particular commodity, materially as money, in the same way in which the exchange value of the money is expressed by commodity; the same thing occurs with M-P. Thus it follows that Adam Smith is right when he says that money as a vehicle of exchange is nothing more than a more complicated form of barter' (Marx's *Grundrisse*, quoted in Cencini and Schmitt 1977: 39, our translation).

A statement by Marx confirms the previous reasoning, that surplus value does not derive from wages being spent: 'surplus-value acquires the form of a revenue arising out of capital' (Marx 1867 [1982]: 712, I). The simple reproduction of capital consists of maintaining companies', or capitalists', monetary capital thanks to the wages fund, or capital used by capitalists to pay wages to workers, being recovered by companies at the moment in which wages are spent to acquire products: in this reproductive process, there is no way for profit to be generated by wages spent. Even when speaking of widened production, the spending of wages generates no surplus value.

In Marx's analysis, surplus value can be realized only with the sale of over-production, which is to say 'profit must be formed monetarily. This monetary formation

poses a problem Marx never managed to solve and which, after him, no one else has ever managed to solve' (Cencini and Schmitt 1977: 40, our translation): '[t]his question appears difficult at first glance, and neither Tooke nor anyone else has yet answered it' (Marx 1867 [1982]: 405, II). Marx's reference to Tooke underlines Marx's rejection of profit theories that view it as a simple difference between price and value. Thomas Tooke is among the authors of such theories. As we have said, the law of exchange between equivalents does not allow for the transfer of profit to companies or capitalists, because the spending of income is final.

The way in which profit is realized monetarily is therefore still to be explained. Marx states that surplus value is positive and that it is anticipated by the capitalist class as money, gold, or credit money (Cencini and Schmitt 1977: 47, our translation): '[i]t was assumed […] that the sum of money that the capitalist casts into circulation to cover his individual consumption […] is exactly equal to the surplus-value that he produces and hence has to convert into money' (Marx 1867 [1982]: 410, II). See Cencini e Schmitt (1977:49-51) for a detailed analysis of this issue.

It is unsurprising that Marx views gold as a means for anticipating profit. As conceived prevalently in the 1800's, money is associated with metal, especially gold. The gold produced by certain capitalists would guarantee the existence of the money necessary to feed wage funds and guarantee an anticipated surplus value in the economy. However, a valid doubt is expressed by Cencini and Schmitt (1977: 48) as well as other authors (see for instance Parguez 1975, 1996; Barrére 1979; and Graziani 1989, 2003): is gold a commodity or money?

> From the moment in which any type of commodity is employed as money, it is evident that its own particular qualities are rendered abstract so as to keep only its role as a measure of products. In its role as money, gold measures products, while it is itself measured as a commodity. Yet in the final analysis, it is never gold that measures commodities, but rather socially necessary labour time. Any attempt to measure commodity with gold would incur the error inherent in

measuring a commodity with a commodity (Cencini and Schmitt 1977: 48, our translation).

To respect equivalency between all commodities, gold must be viewed in the same way as all other goods and cannot be viewed as money. Therefore gold, following this line of thought, cannot be used to realize surplus value monetarily, since it is the gold itself, as good, that must be realized monetarily (Cencini and Schmitt 1977: 48).

Another hypothesis proposed by Marx is that capitalists advance 'the income necessary to realize (monetarily) their surplus value. […] The amount of income advanced must correspond to the amount of surplus value to be realized' (Cencini and Schmitt 1977: 51-52, our translation). However, the two authors immediately reject the possibility that profit might be realized through its advance in money form by capitalists: its anticipation in fact requires the pre-existence of profit. Therefore this existence of profit undoubtedly remains unexplained by Marx.

Marx feels that 'value and surplus-value contained in these commodities must first be realized in the circulation process' (Marx 1867 [1982]: 966, III). Nevertheless, he is unable to explain, without contradicting himself, how profit may be formed or how it may be realized monetarily:

the two operations that define profit (its formation and realization) must be reconciled with the determination of value through labour and its subsequent distribution among different economic agents. […] The products' measure should be determined immediately, which is to say, their exchange value first of all, with a subsequent analysis of how they are distributed (Cencini and Schmitt 1977: 61, our translation).

The problem noted by Cencini and Schmitt (1977: 23) in Marx's analysis of surplus value lies in the determination of a measure that renders all types of work homogeneous. Marx identifies this measure in simple labor: '[t]he various proportions in which

different kinds of labour are reduced to simple labour as their unit of measurement are established by a social process that goes on behind the backs of the producers' (1867 [1982]: 135, I). Might such a measure prove acceptable within a theory of surplus value? Although not the case in physics, logic in economics demands that all units of measure should be a-dimensional. This therefore means that for labor, too, a measure should be found that is without dimensions. The solution proposed by Cencini and Schmitt (1977: 24, our translation) is that of finding an 'arithmetical unit' that, unlike a temporal unit, allows for both the homogenization of all labour, thanks to it's a-dimensional characteristics, as well as for the measurement of product value. As anticipated by Keynes with the concept of "wage-unit" (1936), the two authors identify this measure with 'monetary wages distributed as remuneration of labour' (1977: 24, our translation): the homogenization of work takes place thanks only to the use of monetary wage, an a-dimensional unit of measure. Now, the line of reasoning for which surplus value is given by the difference between labor and labor-force is cast into doubt by the following consideration: 'if the wages distributed are the measure of all goods produced, no difference can arise between remuneration and the workers' product' (Cencini and Schmitt 1977: 26, our translation). Since the product is measured entirely by wages, the Marxist product-labor equivalence can logically be substituted by the Cencini-Schmitt product-wage equivalency: wages render products homogeneous and are their measure, which raises a question over the distinction between labor and its force (ibid.: 27). But there is more: the very possibility that profit is formed as described by Marx is thrown into doubt by this new product-wage equivalence. In its simplicity, the analysis displays a 'contradictio in adjecto' (ibid.: 26): 'wages are simultaneously the measure of all products and that of just the labour-force' (ibid.: 27, our translation), which is to say, the measure of two commodities of different values.

We shall repeat this line of reasoning, following the two authors. In Marx's theory, wages correspond to the product in its totality. Wages are also the measure of the labor force, this being a commodity among many and therefore necessarily of a lower value than that of the total product. This creates a contradiction: the product, 'unless its

surplus value is null', would of course turn out to be different from the product itself. Therefore, only in the case where surplus value is effectively null can the equivalence 'wages = labour force = labour' be valid (ibid.: 27, our translation).

Yet, as Marx himself knew well, in a capitalist economy, '[t]he existence of surplus-value is taken for granted. Thus not only is it presupposed, but it is also presupposed at the same time that a part of the mass of commodities cast into circulation consists of surplus product, and thus represents a value that the capitalist did not cast into circulation with his capital' (Marx 1867 [1982]: 404, II).

Although Marx seeks to elaborate a profit theory in line with the law of exchange between equivalents, which leads him to reject the concept of profit as a simple difference between the price and value of goods, he does not entirely abandon the material concept of money, which implies he holds that profit is real. Marx gives no satisfying explanation concerning the monetary realization of profit. In his theory, profit is added to the production of wage goods: as mentioned by Cencini and Schmitt, in this sense Marx's theory is similar to Ricardo's, for whom wages and profits are in a complementary and additive relationship, profit being the excess of that part of the product destined for consumption.

Yet can the monetary formation of profit be reconciled with measuring profit in wages? Marx's analysis encounters an obstacle that renders it unable to effect such a reconciliation. In fact, the introduction of the labor-force concept into Marx's work is subject to criticism. In Marx's analysis, labor is not a commodity: 'you are all convinced that what you are selling day after day is your labour, that labour therefore has a price, and that, if the price of a commodity is nothing other than the monetary expression of its value, something called the value of labour must certainly exist. However, the value of labour in the currently accepted meaning of the term does not exist' (Marx's *Salaire, prix et plus-value*, quoted in Cencini and Schmitt 1977: 72, our translation). A distinction between labor and labor force allows Marx to formulate his definition of profit as the difference between the value created by labor and the value of the labor force: if workers work longer than the time necessary to receive wages as payment for

their labor force, then not only can companies cover production costs as conceived by Marx (the 'real' cost of production, or wages), but they also obtain a profit or surplus value. 'The capitalist forces workers to prolong the duration of the work process for as long as possible beyond the time limit of work needed to reproduce wages, since it is precisely this excess of work that provides surplus value' (Marx's *Materiaux pour l'économie*, quoted in Cencini and Schmitt 1977: 72, our translation). Marx's reasoning consists in identifying labor as the production cost of the product and the labor force as the production cost of labor, deriving profit from their difference. However, the latter statement is illogical. In fact, since labor is the sole factor in production, it means that by definition its production cost is the production cost of goods. Therefore, the difference between the two costs cannot be positive, but only null:

> the product costs society a sum of labour higher than that represented by the labour force, although the labour force is the sole cost of labour. The contradiction is evident. Logically, the two propositions mean that product costs are measured entirely in labour force. In that case, surplus value cannot be explained by the presence of a part of the product corresponding to a null production cost (Cencini and Schmitt 1977: 73-74, our translation).

Thus, Marx's conception of the labor force must be abandoned.

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