

# **Alternative National Accounting: From an Account System of Money Costs to That of Social and Environmental Costs by *Sebastian Berger and Jacques Richard***

## **1. Introduction**

Today the world is facing multiple social and ecological crises, which cause human suffering that could be avoided through changes in accounting systems. Firstly, the accounting of large international firms and its concomitant national growth accounts are responsible for these crises because they either do not account for the social costs of production correctly or not at all. Secondly, the shortcomings of these monetary accounting systems, that is, their formal rationality, have to be remedied through a substantive rationality that aims at sustainable social provisioning based on full real cost accounting. These calculations in kind are rooted in scientific knowledge regarding conditions for sustainable satisfaction of objective human needs within specific social and natural environments. In this article we synthesize insights from critical accounting science (Richard 2021) and economics (Berger 2017) for a humanitarian and socio-ecological accounting at the national and firm level.

## **2. The limitations of monetary national accounting**

Critiques of national accounting systems based on monetary exchange values abound in the literature, are not new and indeed go back to the time of their inception in the 1940s. The focus of critique since the 1970s has been their interpretation as proxies for welfare or wealth, making their growth *the* goal and success indicator of economic policy. International reform initiatives in the 1980s by World Bank, UNESCO, and UNEP resulted in proposals to maintain existing system due to the deep institutionalization of its statistical apparatus. Information concerning environmental and resource degradation was relegated into so-called “satellite accounts”. (cf. Leipert 1989a, p. 80-86) The devaluing of socio-ecological accounting implied by this fragmentation of accounts is one important reason why the truly international “socio-ecological indicator movement” since the 1960s-70s<sup>1</sup> has not been able to effectively change the usage of monetary economic growth as the primary policy target. Some proposed early on to simply abandon monetary national accounting altogether, instead of its futile fixes, and to rely on “stock accounts” plus socio-ecological indicators to identify negative effects on welfare resulting from resource depletion. (CIRED 1976) However, even then it was perhaps not fully appreciated how much monetary national accounting is interlocked with firms’ accounting standards. Both monetary accounting systems rely on the same one-sided, narrow, and limited notions of capital and costs, i.e. from the viewpoint of the institutions of private property and monetary debt. (for rare accounts drawing these connections see Leipert 1989a, p. 58; Steppacher 2008; Richard 2021) Thus, no change of national accounting can be expected unless both systems are changed at the same time. However, it must be admitted that the barriers to

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<sup>1</sup> See e.g. the 1969 proposal for social reporting by the US Department of Health, Education, and Welfare (Gruchy 1976, p 15, FN 6) but also the overview of the state of the art by Udo E. Simonis (1976).

change are nearly insurmountable given how powerful vested interests defend the benefits they derive from the undemocratic and secretive nature of the processes determining firms' international accounting standards. (for the institutional details of this process see Richard 2021)

At the heart of the debate on both national and firm accounting is *what* "counts" in economic accounting and *how* to count it, which is a question closely tied to struggles over the definition of capital and net income (surplus), and indeed the meaning of "economy". The main problem with existing national accounting lies in adding monetary expenditures or incomes regardless whether they reflect wellbeing or damages, reflect costs of reproducing funds of production or the services and increases of these funds themselves<sup>2</sup>. This renders them inadequate as welfare or wealth indicators. When the increasing ecological and social costs arising from economic production are subtracted (instead of added) via indirect measurement (market prices) of replacement, compensation, avoidance, and defensive expenditures, the wellbeing in industrial countries is declining since the 1970s rather than growing. (for empirical data on this point cf. Daly/Farley 2011; Daly 1989) What is more, already in the 1980s the defensive expenditures were shown to grow three times faster in some nations than the rest of economic activity (for the empirical research supporting this point cf. Leipert 1986; 1987; 1989b) However, even corrected monetary accounts do not provide a basis for determining whether sustainability conditions for the reproduction of natural and social funds of production are met through an increasing level of compensation payments. This is because they cannot answer the crucial question whether there is a sustainable real net product after costs of the economy as a whole, or whether monetary income merely reflects the consumption<sup>3</sup> of funds and stocks of production, i.e. destruction of the lasting sources of social and natural wealth. To answer this question requires knowledge<sup>4</sup> of the preconditions for survival, health, wellbeing, that is, the full and real conservation or reproduction costs of the human being living in and depending on a societal and natural environment (social reproduction). Such knowledge differs from and cannot be achieved or reflected via monetary accounting systems. This insight harkens back to key arguments developed by K. William Kapp (2015; 2000; 1950; 1936) in the context of what remains until today the most fundamental debate concerning the problem of economic calculation, namely, the so-called Socialist Calculation Debate of the 1920s and 1930s. Due to their common origin in the surplus doctrine of Physiocracy<sup>5</sup> Kapp's line of thinking can also be traced back to the so-called first Capital Controversy in economics between Thorstein Veblen and Irvin Fisher. (for these connections see Berger 2021; Kapp 2011; Steppacher 1976) In other words the fact that the calculation controversies over capital and cost are crucially interlinked is significant for any debate on national and firm accounting. Consequently, for present purpose

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<sup>2</sup> For this critique see Herman Daly in Leipert 1989a, p. 63-4.

<sup>3</sup> We refer here to Boulding's critical view of consumption: "Consumption is nothing that should be encouraged or desired, but something that should be avoided or reduced ... consumption is the death of capital and the only effective arguments for consumption are the arguments for death itself." (Boulding in Leipert 1989a, p. 62, author's translation)

<sup>4</sup> This societal joint stock of knowledge concerning the conservation costs of funds of production is the substantive meaning of capital according to Thorstein Veblen and K. William Kapp (Kapp 2011).

<sup>5</sup> Physiocracy was inspired by ancient Chinese economic thought via the works of Mencius. Cf. Marsh 2019.

it is useful to revisit these still topical arguments in more detail in the following sections and combine them with fresh insights from critical accounting sciences.

### 3. The limitations of the firms' market-based calculations

National accounting systems are based on the logic of firms' accounting standards, that is, their particular conceptualization of financial capital and concomitant conceptions of costs and prices. International accounting standards oblige practically all the big firms and countries of the world to systematically conserve financial capital and *it alone*. These accounting tools are not economically rational from the perspective of society as a whole because they permit and indeed incentivize the socialization of the cost of production for the sake of privatizing increasing profits. This is a system of *cost shifting*, in which producers can shift costs of production to society as a whole, future generations, or third parties (consumers, workers, and the natural environment). It is also a system of *unpaid costs* insofar as it does not compensate for or remediate inflicted harm, damages or losses, leaving an unsustainable social cost deficit. This is the case even when the price system may reflect some of these social costs through cost-push inflation arising from higher resource prices due to resource depletion, or governmental programs that pay for the most urgent gaps and damages in the vast web of unpaid social costs. The kind of capitalism to which it gives rise is, moreover, a system of *hidden costs* insofar as it is based on incomplete accounting, where the true costs of social reproduction are not honestly accounted for, thus lacking truthfulness. Furthermore, this system legally mandates producers as per international accounting standards to ignore and avoid responsibility for a share of the costs production, i.e. for damages they cause for sake of profits for owners of financial capital.<sup>6</sup> We are thus dealing with an accounting system that is an institutionalized illusion based on incomplete information. This is not by innocent accident but by intentional design, i.e., a kind of fraud on society, or rationalized irresponsibility. (cf. Leipert 1989a for this point)

The causes of social costs lie beyond monetary accounting standards, however, in the epistemological, ontological, and normative limitations of the market calculus, that is calculations based on monetary exchange values (market prices). Regardless of how well national or firms' accounting standards are corrected, so long as they rely on the market calculus their calculations based on monetary exchange values *do not* account for the social costs of production because they *cannot* overcome the limitations inherent in the individual firms' application of the market calculus:

- *informational ignorance* regarding the full range of systemic and highly complex consequences (synergies, cumulative, hidden, self-reinforcing, threshold effects) as the costs of individual production decisions within the total technological-environmental situation.
- *value incommensurability* with absolute values, which cannot be exchanged for an equivalent but are irrevocably lost (such as life or health of humans, other sentient

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<sup>6</sup> Besides these legal means, producers also avoid paying costs illegally because treating the violation of law as just another business opportunity is often cheaper (due to low and late fines) and thus more profitable than conforming to it.

species, and non-renewable resources), and with heterogenous environmental qualities and quantities that lack a common unit of account.

- *inability* to reflect the irrevocability of the economic process that is entropic on the bio-physical level rather than a reversible exchange relationship.
- *inability* to register the needs of the destitute and future generations who cannot participate in market exchange, failing to guarantee the sustainable satisfaction of basic human needs.
- *inability* to function as a substitute for normative deliberation and decision-making that is concerned with the good of the whole of society and humanity, including precautionary strategies to prevent harm from the weak and those in need and secure sustainable social reproduction.
- *arbitrariness*, which result from the largely arbitrary income distribution (inequality), the awakening of wants through advertisements (consumer manipulation), socialization of costs (incomplete costs), administered prices (mark-up pricing), inflation of all monetary values (debt creation and debt leverage). It is really a reflection of the relative strength of producers and power-relations in society leading to the further inability below.
- *inability* to function as an indicator of scarcity, as an indicator of marginal productivity of input factors per unit cost.
- *inability* to serve as basis for determining economic efficiency (lowest monetary costs) and technical efficiency (lowest physical input quantities per output), demonstrated by the social waste involved in intentional industrial sabotage, overproduction, conspicuous consumption, the edifice complex, and the rise of the rentier sector.

Individual economic decision-making under the guidance of the market calculus is thus only *formally* rational and cannot be deemed rational from the perspective of society. That is why it does not fulfil the requirements of substantive rationality, that is, social provisioning based on *full-real-cost accounting*. This kind of cost accounting is the only way to establish the community's joint stock of knowledge on conditions for sustainable social provisioning as the essence of capital. This argument was developed by K. William Kapp based on a synthesis of the positions of Otto von Neurath on real-term accounting in central planning, Max Weber's concept of substantive rationality, and Thorstein Veblen's concept of capital. (for Kapp's synthesis of Neurath's and Weber's positions regarding the calculative basis for substantive rationality see Uebel 2018) Starting in the so-called Socialist Calculation Debate of the 1920s-30s this line of reasoning demarcates a counter-veiling challenge to Ludwig von Mises' "impossibility thesis" regarding socialist calculation. Kapp's line of reasoning is today mostly shared by ecological and institutional economists. It also demarcates an argument against marginalist utilitarian approaches to economic calculation, including those of market socialists<sup>7</sup> because marginal reasoning is inadequate to deal with the phenomenon of social costs with its irreversible, non-linear, and tipping-point effects. This does not mean however, that markets,

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<sup>7</sup> Due to his focus on central planning in the tradition of Neurath we deem Kapp's approach to the economic calculation problem and the relation between State's central planning and markets to differ from Oskar Lange's or Karl Polanyi's proposals for market socialism. However, Kapp's concept of social costs corresponds to Polanyi's. (Bockman et al. 2016)

money, or private property are abandoned. We develop here in more detail how the formal rationality of market-based capitalist accounting can be rendered consistent with the demands of substantive rationality in a centrally coordinated economy.<sup>8</sup> It is not clear why Kapp did not specify what kind of accounting individual firms should use so that their decisions do not constantly counteract systemic substantive rationality. An approach to national planning that embeds markets through institutional reforms, such as that of legal capital accounting standards that meet the demands of social provisioning, seems to be consistent with American institutionalism in the tradition of Veblen and Galbraith. (on this point see Gruchy 1976)

#### **4. Mainstream misconceptions of social costs**

The failure of markets to account for the full costs of production have been pointed out by economists for a long time. However, a variety of theoretical perspectives offer different interpretations and conclusions. Neoclassical and neoliberal solutions proposed by the mainstream fail to recognize above limitations and propose market-obedient solutions to a problem created by the market calculus in the first place. Their misconception of the problem renders their solutions inadequate however well-intentioned they may be. Most popular mainstream accounts are selective interpretations of the ideas of neoclassical economist Arthur Cecil Pigou<sup>9</sup>. The problem of non-full cost pricing is designated a “negative externality” that are portrayed as easily fixable through ad-hoc and ex-post government interventions to internalize such external costs into the Market through taxation. Social costs are defined as the total costs of production, i.e. the sum of private and external costs. One of the main problems with this view is that even if damages could be causally traced to a singular source taxation does not resolve the problem of value incommensurability and cannot reverse or prevent further irrevocable damages. In addition, there are problems with distributive injustices and damage-shifting to other untaxed domains. Apart from these problems, the terminology of “external costs” reflects the pro-market bias of neoclassical economics, belittles the problem as an exception rather than a systemic institutional-entropic problem, and obscures the fact that damages are 100% internal to the socio-ecological system. It must be noted that different from today’s mainstream misconceptions Pigou himself concluded that the problem was so pervasive that taxation was insufficient and that the nationalization of industry was the only effective solution (on this point see Kapp 2000; and more recently Spash 2019)

Similar limitations apply to the mainstream’s popularized version of the so-called “Coase Theorem”, that is, George Stigler’s neoclassical interpretation of Ronald Coase’s view of “the problem of social costs” (Medema 2010). While adopting Pigou’s neoclassical notions of external and social costs, the main thrust of the argument goes against what is perceived as Pigouvian interventionism. Instead of reducing damages through taxation the construction of a markets is proposed to enable bargaining for compensation payments that can continue so long

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<sup>8</sup> Kapp’s central planning proposal differs from Polanyi’s notion of embeddedness in that he does not propose to eliminate certain markets, such as those for labour and natural resources. Instead, Kapp aims at social controls of markets that guarantee the maintenance of social minima. However, Kapp and Polanyi seem to agree on reforming accounting rules for producers to include social costs of production. (Bockman et al. 2016)

<sup>9</sup> Note the differences between Arthur Cecil Pigou’s full argument and its twisted mainstream version (Spash 2019).

as marginal external costs do not exceed marginal net private benefits. The problem lies in its unrealistic conceptualization as a reciprocal and reversible transaction between equals (egalitarian exchange view rather than an entropic and systemic problem between un-equals) possessing perfect knowledge (rather than complexity-based uncertainty or ignorance) in an (unrealistic) scenario of zero transaction costs that is assumed to lead to the Pareto efficient level of pollution. Despite these and many other theoretical shortcomings undertaken for the sake of maths and one-sided pro-market bias the mainstream version of the “Coase Theorem” successfully popularized the notion of solving “the problem of social costs” through the construction of markets. This has found considerable acceptance at the policy level, resulting in the quest to design markets for pollution permits, which are notorious for loopholes, exemptions, and opportunities for fraud, reflecting the neoliberal playbook of delaying effective action until it is too late.<sup>10</sup> Similar shortcomings apply to the neoclassical mainstream’s so-called “Hicks-Kaldor Compensation” (Swaney 1994) within monetary cost-benefit analysis. External costs are viewed as compatible with Pareto efficient outcomes, despite making someone worse off, so long as the net marginal private benefits are larger than the marginal negative externalities, allowing for theoretical compensation payments to the disadvantaged. The problem with Hicks-Kaldor is that they ignore several of the above stated issues, such as value incommensurability, irreversibility, and informational ignorance. Yet another mainstream misconception spinning off the neoclassical notion of “external costs” goes under the label “asymmetric information” initially developed by George Akerlof. This variant misconstrues losses and damages as inevitable and rooted in the stupidity of consumers. Single shot fixes like Pigouvian taxes are rejected as unworkable. The main problem here is the lack of understanding of the problem’s institutional causes and entropic nature, such that adequate preventative solutions to the substantive problem of social costs cannot be developed. (on this point see Berger 2020)

While differing from these “outcome utilitarian” proposals popularized by neoclassical mainstream economics, Ludwig von Mises also adopts Pigou’s neoclassical concept of external costs. He defines this as a problem of property rights infringements that must be addressed by the judiciary’s tort law and compensation payments rather than economics. However, this “process utilitarianism” also fails to acknowledge above limitations of the market calculus. It adopts a linear understanding of causality and traceability between damages and source, leads to unequal handling of similar cases within the court system, works only ex-post with no prevention strategy, shifts the burden of responsibility to rectify the situation onto victims, and fails to account for irreversibilities and value incommensurabilities. These problems notwithstanding the legal approach to social costs has been a favorite with neoliberals as corporate interests find it relatively inexpensive compared to political lobbying. Also, legal procedures favor commercialized corporate science over publicly funded science, therefore establishing the version of truth that is most suitable to corporate interests. (on this point see Mirowski 2011)

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<sup>10</sup> On this point we agree with Mirowski (2013)

In conclusion, above mainstream accounts of neoclassical and neoliberal theories of “externalities” are failed attempts to capture the real nature of the problem of social costs based on an unwillingness to acknowledge the above mentioned limitations of the market calculus, that is, its purely formal rationality. This is mostly the result of the marginalist utilitarian calculus based on a purely subjective individualist value theory. This is not only the conclusion of Kapp but also of neoclassical economist and expert in Cost-Benefit Analysis, Allen V. Kneese (1976): namely that utilitarianism’s Cost-Benefit Analysis cannot answer the most important policy questions regarding decisions on modern technologies, because they are of a deep ethical and political character which they don’t solve and instead obscure.

### **5. Full real cost accounting: embedding national and firm accounting in substantive rationality that is preventative and precautionary**

To make formal rationality of market-based accounting more consistent with the demands of substantive rationality firms’ accounting and national accounts must reflect the total real costs of production, meaning they must no longer avoid, ignore, hide, or shift costs. While the idea of full cost pricing seems to be consistent with mainstream economics the difference is in its substantive understanding of “costs” and “capital”, their calculations in kind, and the subservient role these calculation play within a substantively rational economic deliberation process that is normative. What is required is no less than a broadening of the conceptual basis of economics, including notions of capital, costs, profit, income, net production, and a reform of accounting systems based thereon. (on this point cf. Kapp 1950; Leipert 1989a, p. 42) This demonstrates that economy and its accounting or calculation in modernity are about no less than a struggle over facts and truth (ibid p. 43; Berger 2021) (for the relationship between capital, economics and Truth see also Thorstein Veblen’s conception of the principle of “make-belief” in the system of business enterprise and capital 1904; 1908; and with respect to economics Philip Mirowski 2013).

Full real cost accounting adopts a substantive account of social costs that is reproduction or conservation-oriented (in contrast to the mainstream’s monetary exchange value (market price)-based account). This is rooted in the humanitarian ethic of preventing harm and scientific facts regarding requirements for the satisfaction of objective human needs that are indeed social needs, and their social valuation (normative decision making). The focus on conservation contained in the concern for social and ecological reproduction can be traced back not only to Physiocracy but also the concept of “sustainable yield” in German forestry management since the Thirty Year War, including production plans for oak forests spanning 200 years. (see Prodan 1976)

To establish this understanding of costs requires *comprehensive knowledge of consequences* of allocation and investment decisions, the choices of techniques, resources, and their flow rates. Such knowledge can only be obtained through centrally coordinated scientific assessment studies because it deals with system-wide environmental phenomena, which escape the tacit or

local knowledge of individual firms. The nature of these effects is typically complex, highly dispersed (entropic), cumulative (additive) and synergetic (joint-causation), non-linear (tipping points), self-reinforcing (positive feedbacks), emergent (self-organizing novelty), unevenly spread out on the time axis (time lags) and regionally (not nationally or locally), and even hidden for considerable periods of time (invisibility, ignorance). Consequently, this kind of knowledge is by necessity neither exact nor determinate but preliminary, involving a high degree of uncertainty and even ignorance. Therefore, precautionary, preventative, and system-wide collective-normative decision-making is needed based on careful deliberations regarding ends and means based on expert knowledge, local citizen participation, past experience, experiments, diagnosis of the situation, prognosis, and prudence. These scientific assessment studies on environmental conditions under the impact of modern technology serve the construction of socio-ecological indicators as quantitative measurements that capture heterogeneous environmental qualities. Indeed, this raises the issue of the social control of technological choice and technological assessment studies.<sup>11</sup>

The goal is to determine the safe zones for social and ecological reproduction (conservation) through scientific research into the minimal requirements for balanced environmental states and human needs, which together serve to define safety standards. These are social minima that have represent social use values because they prevent and reduce the damages to and loss of human life, health and wellbeing. Indeed, empirical research indicates that creative ex ante measures to protect the social and natural environment are cheaper than reactive ex post remediation due to the non-linear increase of clean-up costs per degree of cleanliness. (Leipert 1989a, p. 119-21) Present proposal for substantive rationality and social control of the economy is thus consistent with the Veblenian tradition of institutional economics. (for a synthesis of these national planning proposals and their motivation by the problem of social costs see Gruchy 1976; on social costs as a root theme of institutionalism see Rutherford 2015) Legal accounting standards based on full-real cost are one of the main pillars of this approach, consistent with what John M. Clark called “humanist accounting”. (see Berger 2017)

## **6. The meaning of social (opportunity) costs**

Closing the gap between the actual and the socially safe and sustainable state creates social benefits that are socially costly. These are the real (substantive) social costs of guaranteeing the sustainable satisfaction of basic human needs, without which social reproduction is not guaranteed. These social costs are not accounted for by the formal rationality of capitalist accounting standards in private firm’s market activities and left as a social cost deficit. In other words, the profit levels of industries partly reflect their ability to socialize costs, such that expenditures of the governmental sector partly reflect the social costs required to obtain the

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<sup>11</sup> International efforts, including the OECD’s, for scientific technological assessment studies and the democratic governance of technology or technological choice are key for environmental control and planning (see Kapp 1976, p. 209-10) as waste levels and conservation are partly a function of technology (CIRED 1976). However, today’s waste levels are a clear indication that efforts on this front have not delivered the results hoped for since the heyday of this movement, partly due to secrecy involved in the military-industrial complex, the widespread application of Cost-Benefit Analysis systemically overestimating benefits and under-rating risks and costs, the lack of a corresponding international governance structure, loopholes, and lack of robust controls.

social benefit of maintaining sustainable social reproduction. This does not mean that all social costs are paid for because it is possible that a large part are still shifted around, avoided, and remain hidden until it is either too late or crises mount that force government into action. In particular, a rising level of monetary social cost payments does not automatically mean an increase in sustainability as, for example, the vicious cycle of rising monetary clean-up costs for an ever more polluted environment indicates. An altogether different understanding of social costs is required based on the in-kind costs of social reproduction: what are the service-rates consistent with the fixed reproduction rates of funds of production (natural resources, labor, and machines)? What does it cost in real terms to maintain funds of production as much as possible (maintenance or replacement costs) within the limits imposed by the entropy law? What is being given up in real terms in order to maintain existing funds of production for the continued creation of social benefits?

Allocation-decisions based on such in-kind social cost calculations are always based on the (social) opportunity costs, i.e. forgone alternatives. These alternatives are heterogenous and there is no homogenous unit of account for them. Rather, social costs are the substantive and composite effects (forgone alternatives) of specific allocation decisions, some of which are bio-physical others more social-psychological or spiritual. They can be analyzed, measured, computed, and visualized via a range of quantitative and qualitative research methods, e.g. Flow-Fund Matrix (Georgescu-Roegen 1971), the Social Fabric Matrix (Hayden 2015), System Dynamics (Radzicki/Tauheed 2009; Mallick et al. 2014), and grounded research (Lee/Cronin 2016) involving local citizen participation. Generally, the arrow of time inherent in the entropy law affects the life and needs of generations not yet born. The inescapable complementarity of input factors in the production function makes increasing entropy inevitable. This implies an inevitable and irrevocable shifting of a share of the social costs of reproduction towards the future as a modality of Time, meaning that social cost and social economy ultimately concerns the Time of humanity on Earth<sup>12</sup>. Thus, the level of social opportunity costs has to be determined in normative-ethical and collective decision-making regarding service and flow rates of funds and stocks of natural resources. Social costs and benefits are thus based on humanist criteria rooted in empirical knowledge of objective human needs and ways and means to guarantee their satisfaction under the impact of modern technology that poses new threats to human survival and well-being.

In sum, this substantive meaning of social costs and benefits reflects a substantive economic rationality concerning the conservation of the life process of society, i.e. the social economy. This is consistent not only with Max Weber's concept of substantive rationality, Neurath's real term calculations, but also with Thorstein Veblen's concept of capital as practical knowledge oriented towards livelihood in the material world, his understanding that social waste rises with the degree of separation from such knowledge, and John M. Clark's understanding of cost-shifting. This institutional or social economics lens also explains why Kapp adopts the term

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<sup>12</sup> Georgescu-Roegen's specifics: "We must come to realize that an important prerequisite for a good life is a substantial amount of leisure spent in an intelligent manner." (Georgescu-Roegen 1975). Kapp notes that Karl Marx identified use values as the source of all real wealth and that their measure is "disposable time". (Kapp 1974, p. 137)

“social costs” rather than “negative externalities” or “external costs”. His starting point is the socio-ecologically embedded economy whose cost in terms of the sustainable reproduction of social and ecological funds of production have to be paid if harm to human life and health is to be prevented. Full or total real costs of production are a combination of private and social costs. The goal must be to hold producers accountable for as large a share of the social costs of production as possible and to end cost-shifting. This occurs through direct changes to the conservation principle of capital accounting standards (see below) and indirect measures, such as robust socio-ecological safety standards, quantity controls for sustainable resource and pollution flows, as direct and indirect controls of allocation and investment decisions. These indirect measures translate into increased monetary conservation costs (user costs) through the market price for replacement costs of natural capital and human capital within firms’ accounting. The latter yields the data for aggregate monetary national accounting. In this way monetary firm and national accounting (formal rationality) is effectively embedded within and adapted to the demands for substantive rationality. This demonstrates how the positions of Mises and Kapp on economic calculation could be reconciled when the market calculus is socially controlled within a centrally coordinated economy. This does not mean that monetary profits will necessarily disappear when cost-shifting is prevented since Post Keynesian pricing theory teaches the weak-constructivist reality of profits resulting from mark-up pricing over average costs, evidenced by many empirical case studies. (Lee 1999)

## 7. Towards a new ecological and human micro and macro accounting: the CARE / TDL model<sup>13</sup>

The objective of this section is to provide a credible and efficient alternative to the micro-economic measures of firm profit and the macro-economic calculation of GDP<sup>14</sup> that dominate the current capitalist world. We deal first with the accounts of firms and then with the national accounts on the basis of very simplified numerical examples.

### 7.1 Firm accounting

In the current capitalist accounting inherited from Florentine entrepreneurs in the Middle Ages the only capital that is strictly conserved is financial capital. Indeed, at the time of foundation of any firm it is the only one to appear on the balance sheet as a debt to be repaid obligatorily and strictly. This is shown in the below balance sheet of a fictitious firm of which X is the capitalist owner:

Assets to be used		Liabilities( debts)	
Money (cash) 15	100	Capital to be conserved due to X	100

<sup>13</sup>CARE: Comprehensive Accounting in Respect of Ecology. TDL: Triple Depreciation Line.

<sup>14</sup>Gross Domestic Product.

<sup>15</sup>To simplify the currency units are not indicated: they could be thousands or millions.

In this old accounting of the practitioners of capitalism, capital is not at all an asset (or a resource) as most economists believe, including Marx, but rather a debt of the firm towards the capitalist, that is to say a thing to conserve<sup>16</sup>. Although the employees of the company have already been hired by contract and the natural elements that make its activity possible (such as atmospheric conditions conducive to human activity or unpolluted rivers) are present and ready for use these two types of capital which are just as essential as financial capital are in no way the subject of an accounting entry on the liabilities side of the foundation balance sheet as capital-debt. Let us now analyze the activity of this company with some very simplified operations to show the main characteristics of this dangerous type of capitalist accounting.

During the first month of activity of this firm we assume that it buys a commodity for 100 and resells it for 320 and has to pay its employees, depending on the labor market, for 50. It ultimately has 270 left in the cash account. It then made a profit of 170 (320-100-50) which appears on its balance sheet at the end of this first period:

Assets (resources to be used)	Liabilities
	Capital to be conserved due to X 100
Money (cash) 270	Profit due to X 170

The corresponding income statement is as follows:

Revenues (sales)	+ 320
Expense for the use of merchandise	- 100
Expenses for the use of employees	- 50
Net profit	170

We can see that these documents confirm the “burden” that the employees represent for the capitalist. This is a very problematic view of accounting where the only capital that matters (which must be systematically conserved) is financial capital: employees, for their part, are not only simple means of the capitalist whose value of force of labor is negotiated on a labor market but also its “enemies” since they reduce his gross profit. We can say that this type of income statement is “Hobbesian”: the salaried man is a kind of wolf for the capitalist man and reciprocally! We can oppose this capitalist accounting ideology with another ecological and human accounting vision in which the three main types of capital that make it possible to found any business will be on an equal footing: this is the CARE / TDL accounting model. To this

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<sup>16</sup>We will therefore speak of a capital-debt concept as opposed to the capital - assets concept of economists.

end, we introduce into our example two additional data from ontological analyses<sup>17</sup> of the human and natural capitals used by this company.

First, for human capital<sup>18</sup> to be effectively conserved, the employees of this company, where they live, should be paid 100 instead of 50 in order to lead a dignified life. This kind of calculation may be based on human indicators proposed by different scientists or human organizations. For example Corning (2011, chapter five) in his “Fair society”, advices to take account of thirteen basic indicators concerning thermoregulation, waste elimination, nutrition, water, mobility, sleep, respiration, physical safety, physical health, mental health, social relationships, reproduction and nurturance offspring. In the same way specialists of the ILO (International Labour Organization) such as Anker and alii (ILO, 2011) propose a list of eleven statistical indicators of decent work. Second, this firm would have to budget for costs of 70 to rent a special device so that it no longer pollutes the river flowing near its warehouse of goods<sup>19</sup>. On the basis of these two data, we can reconstruct the initial balance sheet of this ecological and human firm to make a CARE/TDL type assessment.

Initial Balance sheet of the firm X (CARE/TDL)

Assets (resources to be used)		Liabilities (debts of conservation)	
Financial asset (CU)	100	Financial capital	100
Human assets(CU)	100	Human capital	100
Natural asset(CU)	70	Natural capital	70
Total of assets	270	Total of capitals	270

With this new accounting three types of capital now appear under three different and separate lines of liabilities. They correspond to three separate lines of cost of use (CU) of assets. In this simplistic example of a single period of activity, all types of capital represent cost budgets that are expended in that single period. In the phase of purchasing goods, the cost of these goods will substitute for cash assets. We skip this step to examine the impact of selling the commodity and receiving the money, before any buy back of new commodity and any payment to employees and equipment rentals.

Assets	Liabilities
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<sup>17</sup>These ontological analyses should be carried out by ergonomists, specialists in ecology, unions, etc.  
<sup>18</sup> We underline that human capital within the meaning of the CARE model has nothing to do with that of the American school of human resources, in particular that proposed by Gary Becker (1964).  
<sup>19</sup> The same reasoning, based on the calculation of conservation costs (and not prices such as the famous carbon price), can be applied to the case of the protection of the earth’s atmosphere against green-house gas (GHG) emissions. Each firm will calculate its own carbon costs on the basis of the costs of the measures necessary to reduce its GHG emissions under the limits fixed by the IGEC and register these costs in its system of accounts. With this serious and efficient classical accounting method there will be as many carbon costs as there are firms and the latter will be obliged to quickly change their technologies, which the carbon price system based on the theory of externalities is unable to do (see Chenet and Rambaud, 2020).

Financial asset (CU)	100 – 100= 0	Financial capital	100
Human assets (CU)	100 – 100 = 0	Human capital	100
Natural asset (CU)	70 – 70 =0	Natural capital	70
Common cash	320	Net common profit	50

Within the framework of CARE/TDL, the net profit has been greatly reduced: it has fallen from 170 to 50. This is obviously due to the fact that the firm, to conserve its human and natural capitals, must plan for additional expenses: 50 for human capital and 70 for natural capital. But, despite a sufficient amount of money in “common cash”, the firm has not yet taken steps to ensure the effective conservation of the three types of assets. The corresponding assets were therefore used up without being replenished. Thus, the stock of goods (financial asset) appears at zero on the balance sheet; likewise, the staff were worn out without receiving fair compensation for his wear and tear. Finally, the firm has not yet paid for the service to ensure the non-pollution of the river. The assets corresponding to the three capitals have therefore been depreciated, showing them to be zero. Conventionally, these depreciations give rise to an entry in depreciation expenses<sup>20</sup> in the income statement:

#### Profit and Loss Statement CARE/TDL

Revenues (sales)	+ 320
Financial depreciation expense (cost of good sold)	– 100
Human depreciation expenses (cost of use of employees )	– 100
Natural depreciation expense (cost of use of the river)	– 70
Net common profit	50

We see a triple line of depreciation appear which makes it possible to have an estimate of the total cost of the period corresponding to the conservation of the three types of capital. As can be seen, each type of capital has its own depreciation expenses and, in particular, employees are no longer a burden on financial capital. The balance of the income statement therefore indicates a real ecological and human profit after conservation of the three types of capital. This profit is no longer that of financial capital alone, but a common profit, a profit resulting from the joint action of the three “commoners” that are the three types of capital providers. Ostrom (1990) wanted the commons system to be generalized but was unable to design an economic

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<sup>20</sup> K. William Kapp (1963) is one of the very few economists to have proposed systematically depreciating natural assets. The CARE/TDL method offers the possibility of an accounting systematization of his proposal.

and accounting model that lived up to this ambition. The CARE/TDL model provides the basis for this generalization at the global level.

But let’s come back to this new ecological and human profit. We can clearly see, by comparison with the profit resulting from capitalist accounting, how much the latter was a fictitious profit. Generally speaking, most of the profits currently distributed by firms, more specifically the large firms that dominate the world, are fictitious profits. CARE/TDL accounting can therefore provide extremely useful information on the existence of these “super-profits” of capitalists. As such, it can be the basis of a policy of taxing these excess profits by a State in the service of the ecological and human cause. The proceeds of this taxation could be used to subsidize those who have additional costs because of their commitment to the ecological and human cause, additional costs that the CARE method can also identify. This allows us to highlight three very different cost concepts in any business in conjunction with Kapp's analyzes. On the one hand, there are the private costs of the enterprise: those it really pays under the capitalist system. They are 150 in the case of our example. Then there are the social costs that Kapp talks about, those which are shifted to and born by society as a whole and not, which should normally be the case, by the capitalists. These social costs amount to 120 (50 for employees and 70 for nature). Finally, there are the real total costs of the considered firm in the amount of 270 (sum of the capitalist private costs and the social costs of Kapp).

Let us now return to our example by supposing that the firm performs the last normal step of the process which leads it to the effective conservation of the three capitals. Here is the balance sheet after this final operation:

**Final balance sheet of X (CARE/TDL)**

Assets		Liabilities	
Financial asset (CU)	$100 - 100 + 100 = 100$	Financial capital	100
Human assets (CU)	$100 - 100 + 100 = 100$	Human capital	100
Natural asset (CU)	$70 - 70 + 70 = 70$	Natural capital	70
Common cash	50	Net common profit	50

What happened? It is clear that money has fallen from 320 to 50, which implies an overall expenditure of 270. One can easily see the use of this sum by looking at the evolution of the various lines of the other assets. First, we see that the financial asset has increased by 100. This corresponds to the purchase of a new commodity, which makes it possible to renew financial capital. We then see that human assets have increased by 100: this corresponds to the conservation pay received by employees. Finally, the natural assets also increased by 70. This is the consequence of the payment for the rental of the river protection device. We can then

observe that all types of capital have been preserved (with effects close to inevitable entropy). This conservation can be verified immediately by comparing the level of “value” (meaning conservation cost value<sup>21</sup>) of the capital to be kept on the liabilities side and the “value” of the assets. Normally, three types of auditors, respectively specialists in the custody of the three types of capital, should certify the reality of these conservations.

All these new calculations of ecological costs and profits<sup>22</sup> will lead to new concepts of ecological profitability, efficiency, effectiveness and competitiveness, which it is not possible to study within the limited framework of this text. Moreover, the fact that employees and nature are treated as real contributors of capital will legally make them partners of the firm in the same way as the shareholders. The three groups of representatives of these three types of capital will have one third of the votes in all the management bodies of the firms. We will thus move towards a much more “advanced” ecological co-management than is the current co-management found in Germany in particular. This ecological co-management could also be instituted at the national level with the creation of a special chamber of representatives of the three types of capital providers which will be consulted and will give its approval on any measure of an economic type. Finally, the CARE/TDL model could serve as an alternative to IFRS (International Financial Reporting Standards). These disastrous standards have unfortunately been ratified by states, which encourages companies to pursue anti-human and anti-ecological policies. They constitute a real-world economic constitution in the sole service of the capitalists and must be replaced as quickly as possible. The same goes for traditional national accounts, which leads to the next point.

## **7.2 A new ecological national accounting based on the CARE / TDL model**

The purpose of national accounts is generally to give an idea of the creation of wealth in a given country during a certain period. The most famous of its indicators is the Gross Domestic Product (GDP), although we should favor the Net Domestic Product (NDP) after taking into account the depreciation of all assets that are used for production over several periods, what we will do here.

Basically, in all countries, the NDP is an aggregation of microeconomic data provided by companies in the country concerned, more specifically an aggregation of the income statements of companies. To understand how this type of account is made, we will use the previous example. We first recall the capitalist’s income statement.

Profit and Loss Statement of X (period1)

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<sup>21</sup>There is never any question of a sale value of the assets used in the CARE-TDL model.

<sup>22</sup>Some people may think that the term “ecological profit” is a pleonasm, but in the original Latin profit is something that feels good. The ecological profit we are talking about is a blessing because it brings wealth without compromising the integrity of all the capitals. No compensation is possible between the types of capital and even, concerning the human and natural capitals, between their elements: this is in conformity with the concept of strong sustainability.

Revenues (sales)	+ 320
Expense for the use of goods sold	- 100
Expenses for the use of employees	- 50
Operating net profit	170

Now imagine, at the cost of an outrageous simplification, that this company is the unique and gigantic firm of a country, which would live solely on the import-export of goods and which would have bought goods from abroad for 100 and resell them in the country concerned and in other countries for 320. What would then be the NDP of this imaginary country for the period considered according to the classic accounting rules of national accounts? Two different methods can be used.

The first, known as the deductive approach, consists in taking the revenue (that is to say the sales) of the period and in deducing the consumption of tools necessary to accomplish these sales. This makes it possible to obtain what is called “added value” by the activity of the nation. In the case of our example, the revenue merges with the sales of goods, and the so-called intermediate consumption, or depreciation, merges with the cost of goods sold. So, this nation's NDP is  $320 - 100 = 220$ .

The second method, called additive, consists in summing all the types of income that have been distributed in the country. In our case, there are only two social classes, to which correspond two types of income: on the one hand the capitalists and their profits, on the other hand the employees and their wages. The additive calculation therefore consists in adding the wages of the employees (50) and the profit of the capitalist (170) to again obtain an NDP for the nation equal to 220. Let us compare the microeconomic perspective of the private accounting of the capitalist with the macroeconomic perspective of national accounts. We note that while private accounting focuses, at the level of the balance of the income statement, on the profit of the capitalists of 170, national accounts, on the other hand, is interested in the overall income of all the two classes of employees and capitalists and gives a result of 220 ( $170 + 50$ ). This macroeconomic reasoning can be represented by an income statement of the following type established from the previous figures.

Revenues (price of goods sold)	+ 320
Expense for the use of goods sold	- 100
Balance : NDP	220

In view of this account, some people could say that insofar as they are interested in a macroeconomic quantity (added value), this national income statement reflects a conception of the result of the performance of companies that is more neutral than that established by the capitalists who see in their result only that of their financial capital alone. It is not, as we will show. Indeed, thanks to previous developments devoted to the CARE/TDL model, we know

that the figures for wages, profits and consumption do not give a fair picture of the results of the capitalist enterprise. Indeed, they do not take into account the real full costs or true cost of labor capital or the cost of conserving natural capital. However, what is true for the accounts of capitalists as individuals is also true for national accounts which are based on the aggregation of accounts of individual companies. All current national accounts are therefore incapable of giving a fair picture of the reality of the performance of nations. We will confirm this by showing which would be more correct national accounts

To do this, we will start from the corrected income statement of this capitalist company established by following the rules of the CARE/TDL method:

Revenues (sales)	+ 320
Financial depreciation expense (cost of goods sold)	- 100
Human depreciation expenses (costs of use of employees)	- 100
Natural depreciation expense (cost of use of the river)	- 70
Net common profit	50

We can now resume the NDP calculations on the basis of these numbers corrected to take into account the true depreciation of all capitals and obtain a fair view of NDP. Again, we will distinguish the deductive method and the additive method. According to the deductive method, we deduct all capital consumption (depreciation) expenses from the sales proceeds (320 - 270) and we get an NDP of 50. Why this huge difference with the “official” NDP, which is 220? Because, contrary to the capitalist view, to obtain real added value, we no longer consider that there is only the depreciation of financial capital to be taken into account, but indeed three depreciations of three types of capital. The overall depreciation expense for the period is therefore not 100 but 270. With this type of reasoning, the NDP of 50 merges with the common profit of the CARE/TDL method, that is, real profit both for the company and for the country where that company is located. This is the true measure of a nation’s wealth creation calculated at the macroeconomic level from “sound” microeconomic data. It corresponds to a “macro” version of the CARE/TDL model leading to an ecological NDP: the “CARE”/TDL NDP ”<sup>23</sup>.

**Conclusion**

The economic activity of almost every country in the world is dominated by an accounting system harmful to nature and human beings inherited from the founders of modern capitalism in the Middle Ages in northern Italy. This aberrant accounting system is currently materialized by an international accounting code endorsed by national state accounting laws: the IFRS Code,

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<sup>23</sup> For an appliance in matter of climate finance see Chenet and Rambaud (2020).

the only truly global law without equivalent in other social or natural spheres. If we really want to prevent the current ecological, pandemic and human crises, citizens of all states must not turn to false solutions such as green capitalism, green finance, internalization of externalities, carbon pricing, ecological taxation, or extra-financial reporting. They must first of all demand the abolition of current IFRS accounting standards and their replacement by other accounting standards adapted to the systematic conservation of natural and human capitals. The conservation of these capitals is based on an understanding and calculation of their full real social costs of reproduction. The task for accounting is to compute these social costs of production in real terms as a basis for substantive rationality, i.e. collective and normative decision-making regarding the social provisioning for human needs, the guarantee of social-ecological minima and corresponding social benefits. These collective decisions transpire into the price system (real full cost-based pricing) within the new CARE/TDL model rendering the formal rationality of firms' capital accounting more consistent with the demands of substantive rationality.

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