HOW TO ARTICULATE BEYOND GDP AND BUSINESSES' SOCIAL AND ENVIRONMENTAL INDICATORS?

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How to articulate beyond GDP and businesses' social and environmental indicators?

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Abstract. In the past decades, new indicators have been developed to provide alternatives to Gross Domestic Product (GDP) at the macro level, and to financial indicators at the business level (businesses' social and environmental indicators). However, these new indicators are poorly articulated between the business and the macro level. This paper aims to discuss the different possibilities of articulation that exist and outline a framework for a better micro-macro articulation. Firstly, we draw from the example of GDP and traditional business indicators by analysing the way they are articulated. Secondly, we review how sets of alternative indicators aim to articulate the macro and micro level by analysing indicators constructed around Gross National Happiness (GNH) and Sustainable Development Goals (SDGs). This research shows that two specific types of articulation exist between indicators at different levels, one referred to as the 'accounting' type and the other called the 'conceptual' type. Their strengths and limits will be discussed, as well as how they can be combined. Finally, recommendations will be provided on how to best articulate beyond GDP and business level indicators.

Keywords. Sustainability indicators; Beyond GDP indicators; Business indicators; Corporate Social Responsibility (CSR); Micro macro articulation; Sustainable Development Goals (SDGs), Gross National Happiness (GNH)

JEL classification. E0, M41, N10, N40, Q56

Highlights:

- The way Gross Domestic Product (GDP) is linked to micro level data and indicators
- How existing beyond GDP and businesses' social and environmental indicators are articulated
- The existence of two types of articulation between a macro and a micro level indicator
- Insights on how to best articulate beyond GDP and business level indicators

1 Introduction

As current ecological and social challenges become increasingly pressing, so does the demand for a paradigm shift in socio-economic policies. Because of this, many initiatives have been proposed at varying levels to orient society towards an ecological and social transformation (Brand, 2016). Among them, it has been argued that a change of performance indicators should occur, both at the national (Stiglitz et al., 2009, OECD, the European Commission…) and the corporate level (UN Global Compact, WBCSD; European Parliament's Directive 2014/95/EU, the CSR movement…). New indicators have accordingly been developed for policy makers and businesses, measuring environmental and social issues such as pollution, health and inequality. The advocates for these new indicators acknowledge that the pursuit of traditional objectives only, such as economic growth or financial return, cannot give a proper response to the critical challenges of climate change and rising inequality (Kramer and Porter, 2011; Cassiers & Thiry, 2014). The new indicators are thus meant to monitor and evaluate the progress of ecological and social objectives, both at the macro level (Beyond Gross National Product, or beyond GDP indicators) and the business level (businesses' social and environmental indicators).

Although they share similar goals, these new indexes are poorly articulated with each other, both in theory and in practice. Very few sets of indexes that encompass both the macro and the business level have been reported. Only three set of indicators seemingly exist that articulate them. These are constructed around Human Development Index (Ul Haq, 1995; Spangenberg & Bonniot, 1998), the Sustainable Development Goals (UN, 2015; SDG Compass, 2015) and Gross National Happiness (Ura et al, 2015; Wangdi et *al*., 2018). The topic of the articulation of macro and business level indicators (and more generalised macro and micro level indicators) has also been neglected in the literature. It is only recently that it has become somewhat discussed, in parallel with the rise of sustainability concerns. On the one hand, the field of research 'Sustainability in context' (Whiteman et al., 2013; McElroy and Baue, 2013; Searcy, 2014; Beare et al., 2014) states that sustainability performance assessments must be carried out relative to social and ecological norms, standards or thresholds, and never in the absence of them, as it is often the case. In particular, they argue for the use of science-based targets for businesses, some of them being defined with respect to macro level indicators. On the other hand, the rise of Sustainable Development Goals (UN, 2015) at the macro level lead to the development of new business reporting and accounting tools to measure businesses' contributions to SDGs. This permitted links between SDGs and the accounting discipline (Bebbington, 2018). However, it appears that no discussion specifically encompassing indicators at both levels has taken place in scientific literature.

There are several reasons to believe that a better articulation of business and macro level indicators could foster a paradigm shift. The first reason is that indicators drive norms, values and worldviews (Desrosières, 2008). Through this articulation, the propagation of the priorities of an indicator can strengthen the development of an epistemic community around a common goal at both levels. Secondly, similar or common indicators can improve collective action between micro and macro actors by combining their agendas (Kania and Kramer, 2011; Pattberg and Widerberg, 2016). This could especially be the case in a scenario in which citizen or business-based initiatives have a key contribution to a socio-ecological transformation, but lack coordination (Geels and Schot, 2007; Mertens and Bauwens, 2017; Littlewood and Holt, 2018; Van Zantem and Van Tudler, 2018). Consistency in action can be further reinforced by the use of similar targets at the macro and the business level. This would help coordinate the objectives of micro and macro actors. Thirdly, there is a growing concern among shareholders, investors and other external stakeholders to analyse businesses' social and environmental performance. If the framework used at the business level is similar to a well-known macro level framework (*e.g*. Sustainable Development Goals), it will increase the clarity of social and environmental reporting. Finally, having standardised business data on social or environmental issues could help the gathering of macro level data, which sometimes currently lacks the establishment of macro level indicators (Seaford, 2013).

To summarise, a coherence between business and macro level indicators would help coordinate ideas, actions, evaluation and data gathering towards a socio-ecological transformation. This will probably not be the main driving force, but one piece of a new broader puzzle which will include many other policy changes (Alperovitz et al., 2012).

Even if a better articulation of beyond GDP and businesses' social and environmental indicators could foster a transition, it is not clear that it would be feasible. At first glance, it appears complicated due to the variety of elements they cover and the absence of a single numeraire. Moreover, the wide diversity of indicators both at the macro and at the business level makes a 'one size fits all' framework improbable. The question of this paper is thus 'How can beyond GDP and businesses' social and environmental indicators be best articulated?', with the underlying objective of speeding up a socio-ecological transformation.

The article is divided into six sections including the introduction. Section Two presents the two fields of research of beyond GDP and businesses' social and environmental indicators, for those who are not familiar with them. Section Three presents how GDP is articulated with traditional business level indicators in order to draw insights for alternative indicators. The next section presents how sets of alternative indicators such as GNH and SDGs articulate the macro and micro levels. In the fifth section, two specific types of articulation are highlighted that can exist between indicators at different levels, one referred to

as the ‘accounting’ type and the other as the ‘conceptual’ type. Finally, recommendations are provided on how to better articulate beyond GDP and businesses’ social and environmental indicators.

2 Beyond GDP and businesses’ social and environmental indicators

As there are few links between the literatures on macro and micro level alternative indicators, this section intends to introduce these sources to readers who are unfamiliar with one or both of them.

Beyond GDP indicators

The common feature of beyond GDP indicators is to take social and/or environmental problems into account, in addition to or instead of economic growth or traditional economic indicators. Whatever variety of terms are used to specify the objective these indicators refer to (well-being, quality of life, social progress, human development, happiness, sustainable development, see Pissourios, 2013), these indicators are considered as having a similar intent, which is a desirable society, measured through a variety of topics. A typical beyond GDP indicator would include variables such as health, education, standard of living, environment, inequality, civic engagement, and safety. Some of them are synthetic indicators, which means the aggregation of various variables in a single number. Others are dashboards, meaning that they are composed of variables kept separate. Synthetic indicators are praised for their ability to be easily communicated to a large audience, while dashboards offer a more detailed picture of reality. Synthetic beyond GDP indicators can also be monetary or non-monetary. A monetary indicator means that social and environmental performances are translated into monetary terms through various accounting methods. This is the case for a significant minority of beyond GDP indicators, such as the Index of Sustainable Economic Welfare (Cobb and Daly, 1989), World Bank’s Adjusted Net Savings (Bolt *et al.*, 2002) or UNEP’s Inclusive Wealth Index (Managi and Kumar, 2018). However, monetisation is a subject of debate, due to questionable theoretical or technical assumptions (Thiry, 2014; Roman and Thiry, 2016). One main critique is that single monetary numeraire might overshadow a degradation of social or environmental capital when it is balanced with an increase of financial capital (which is called a ‘weak’ vision of sustainability) (Dietz & Neumayer, 2003). Note that the field of beyond GDP indicators is subject to a lot of other methodological debates: Should stocks or flows be measured? Which aggregation method should be used? Which variables should be included? With what weighting? Etc. Answers to these questions are often driven by theoretical framework or political values of indicators’ initiators (Börgnas, 2016). In this

respect, the degree of radicality of beyond GDP indicators is heterogenous. Some indicators convey a representation of a desirable society which is very different from GDP's (*e.g*. Happy Planet Index, Sustainable Society Index…), while other indicators remain closer to traditional thinking (*e.g.* Human Development Index, Social Progress Index…) (Malay, 2019).

In this paper, the analysis is focused on non-monetary indicators, for the sake of concision and in acknowledgement of the relevance of the critiques on monetary indicators. According to research by Morse (2014), among non-monetary indicators, those that have received the most widespread attention are the Ecological Footprint and the Human Development Index.

Businesses' social and environmental indicators

Businesses' social and environmental indicators cover business level indicators that take social and/or environmental issues into account. These indicators are used in numerous approaches aiming to assess and communicate the social and environmental performance of businesses (Gilbert *et al.*, 2011). Among those approaches, we find Corporate Social Responsibility (CSR), corporate sustainability, environmental performance, social performance, global performance, social impact, social utility, social return, social benefit, blended value, shared value... All of them use indicators, which are then labelled as "CSR indicators", "corporate sustainability indicators" and so forth. Depending on the approach, these indicators are included in various forms: reports of good practise, monitoring tools, certification processes, best in class rankings, etc. Even if some of them are well-known (Global Reporting Initiative (GRI), ISO 26000, B-Corp…), many businesses create their own tools or adapt existing ones, in order to better capture the specifics of businesses and sectors. This variety results in a divergent set of businesses' social and environmental indicators, with more diversity than at the macro level. However, all of these business indicators have a similar intent, which is to measure progress towards other objectives apart from solely financial or economic performance. Among the numerous different businesses' social and environmental indicators, the GRI, first developed by a US non-profit organisation in 1997, has become recognised as the de facto global standard for disclosing non-financial information (Etzion & Ferraro, 2010). It includes a wide range of economic, social and environmental variables that can be reported by businesses (Global Reporting Initiative, 2016).

Businesses' social and environmental indicators originated in the 1970s and 80s (Innes, 1989; Hertzig and Schaltegger, 2006; Richard, 2012). During the last decade, they multiplied among traditional businesses as well as among non-profit and social economy organisations. Today, a typical social and environmental indicator of businesses would include variables such as health and safety problems, training hours, gender inequality, the wage gap, energy

savings, greenhouse gases emissions, good governance, and job creation. Most of these are dashboards. Only a minority, such as the Social Return on Investment (SROI), B-Corp Certification, or Gross National Happiness (GNH) Certification use a form of aggregation towards one final number or score, and even fewer use monetisation methods. They can have a primarily internal focus, which is, being targeted to best help managers and workers change their practises ('accounting for decision making', according to Zimmerman and Yahya-Zadeh, 2011). They can also have an external focus, so that the business can report its activities to various stakeholders such as shareholders, customers, NGOs… ('accounting for control'). This external focus is the most widespread as more and more businesses seek for public approval and new customers through the communication of sustainable practises.

The field of businesses' social and environmental indicators is also up for debate: What is the scope of a business? How can causality and responsability be assessed? Should inputs, processes, outputs, outcomes, or impacts be measured? How can we balance social and environmental issues and profit imperative? In this regard, a major concern is about for-profit businesses' possibilities to really adopt social and environmental behaviours, and not just use social and environmental indicators for window dressing (Laufer, 2003; Banjeree, 2008; Boiral, 2013).

Beyond GDP and businesses' social and environmental indicators thus share a common objective at different levels, even if they often differ in terms of shape and content. In this paper, the term 'alternative indicators' will be used when describing these two sources simultaneously. Before analysing their potential for articulation, it is worth examining the way such articulation is performed among traditional economic indicators.

3 How are GDP and business level measures articulated, and how were they articulated in the past?

GDP and financial indicators successfully became leading indicators during the 20th century. Analysing the context of their emergence and the way they were articulated allows for better understanding of the possible future of beyond GDP and businesses' social and environmental indicators. In this section, a historical perspective is utilised to address the micro-macro articulation of traditional indicators in two steps: firstly, we will show that the main articulation between GDP and business indicators consisted in the historical simultaneity of the pursuit of increase of market value both at the government and the business level. More than just a concurrence, it is the articulation of the goals of businesses and governments that converged. Next, we will demonstrate how the construction of GDP is based on business data, in particular value

added, while highlighting the similarities and differences between national and business accounting frameworks.

The simultaneous emergence of GDP and business financial indicators

During the 19th century, the role of the government was the fulfilment of regalian functions: police, army and justice. The statistics developed at this time were adapted for this purpose. Major statistical changes often take place during crisis (Desrosières, 2014). In the first half of the 20th century, the crisis of 1929 and the Great Depression triggered the development of new macroeconomic tools. In order to solve economic problems, more and more economists and policy makers suggested that the government adopt an interventionist stance in the economic sphere (Schmelzer, 2016). Such a new stance needed data in order to reflect the dynamics of production, investment, and consumption, and act upon it.

Governments therefore developed large projects to gather such data. This gave rise to the first official measurements of national income and GDP, among which is the famous work of Simon Kuznet in the United States (Kuznet, 1934). These accounts later received support from blooming Keynesian economists, who needed information to design and put into operation their models of economic interventionism. National accounts (including the most publicised GDP) were thus designed in order to help governments and economists implement new policies of economic planning.

National accounts first took place alongside (and independent of) existing business accounts. Business accounting has a millennia-old history, but its modern form came about in the 19th century. There was an increased use of accounting for management purposes, rather than just as a record. Ratios such as profit ratios became popular. They have been very diverse across countries, time periods, and even across companies. Some first attempts at national harmonisation occurred in the 19th century (mainly for tax purposes) and attempts of international harmonization took place essentially after the Second World War (Camfferman and Zeff, 2007). Despite the variety of accounting practises, the common objective of western business accounting after the 19th century was that its main indicators were meant to aid business activity, motivated by a profit objective and expressed in terms of market value.

The first half of the 20th century was marked by a rising willingness of governments to measure private economic activity (for economic interventionism), in parallel with pre-existing measurement practices of businesses' economic activity (to generate and attract profit). From then on, both governments and businesses developed accounts and indicators to measure and stimulate market value (GDP did not include production of public administration at this time). More than just monitoring tools, these indicators and accounts became references. This gave them a quasi-institutional function

of behaviour shapers (North, 1991), which further reinforced the objective of market value creation they meant to indicate.

The systemic consistency of GDP and business financial indicators

The stance of this paper is that the alignment of objectives of government and business and the development of new indicators in the first half of the 20th century was not an accident. It was caused by two major changes, which were the basis of the success of GDP and business financial indicators.

The first one is the emergence of Fordism. Fordism is a model of organisation and development of businesses that emerged in the beginning of the 20th century. It is characterised by massive economies of scale and scope due to the technologies of the second industrial revolution. This new capacity led to mass production and mass consumption, greater division of labour, and the constitution of oligopolies and multinational corporations (Chandler, 1992). These transformations in production were a basis for the development of new indicators. The increase in the size of businesses that emerged from Fordism gave rise to the need for better control and evaluation of managers, as growing distance between general direction and production units led to decentralisation of decisions and to nearly independent business units. The discipline of management control emerged at this time, as well as new financial indicators. Of them, the most well-known is the Return On Investment (ROI) in 1920s at General Motors (see Brown, 1977; Chandler, 1990). The role of financial indicators was to control and coordinate activity in the new business structure. They spread widely across industries in the United States and around the rest of the world. As a result, Fordism fostered new developments in business accounting and indicators.

GDP also finds one of its origins in Fordism. As productivity grew drastically in Fordist industries, this translated into high rates of economic growth, the highest in human history (Gordon, 2017). The growth that came out of increased productivity was a subject of study by economists, creating a demand for analytical and monitoring tools such as national accounting. Growth was also the fuel for Keynesian macroeconomic policies and the investment cycle, which further developed and improved national accounts. Fordist growth has been a facilitating factor of the relevance of Keynesianism and the utility of national accounts (which in turn helped to monitor and sustain it).

A second factor that solidified the pursuit of market value and its measurement were the institutionalised compromises that took place just after the Second World War. Institutionalised compromises were agreements between unions and capitalists in most western countries (Boyer and Julliard, 2002). Unions agreed to Fordist management and to limit class struggle within a capitalist economy. In exchange, capitalists agreed to wage increases, taxes,

government intervention, union rights and the emergence of the welfare state. At the business level, the legitimacy of the profit seeking model had been preserved, even if it implied stronger labour regulations. At the macro level, the role of the government expanded drastically to improve workers' quality of life. In this context, economic growth became a shared goal by workers and capitalists. Growth could at the same time increase public revenue, aggregate demand (which benefitted both sides) and mitigate class conflicts (Cassiers and Thiry, 2014). The political model that emerged from institutionalised compromises was social democracy. The reconstruction of Western Europe was hence accompanied by an institutionalisation of the goal of economic growth.

In terms of indicators, GDP remained the main numerical representation at the macro level, although it has been subject to alteration. From the 1950s onwards, the United States pushed for harmonisation of national accounting in order to distribute Marshall Plan aid, and to determine national contributions to international organisations such as OECE (Schmeltzer, 2016). Moreover, the production of public administration was progressively included in GDP's calculation during the next decades. At the business level, while the majority of businesses preserved a profit seeking objective, financial indicators were confirmed as central indicators. Institutional compromises and the collaboration between market and public intervention maintained the indicators in use, but modified their substance at the macro level.

In summary, GDP and a new wave of financial indicators such as ROI surfaced around the same time, partly for the same reason (the management of Fordism and institutional compromises), and partly for additional reasons (the emergence of an interventionist government). In both cases, the measure of market value was a central objective. At the macro level, it was used in order to stabilise the economic cycle and provide revenue to mitigate class conflict, while at the business level in order to increase productivity and profit. As both businesses and governments were committed to an objective of increased production, GDP and new financial indicators became dominant tools. They had the same target, which was a capitalist/mixed economy (monitored at the business level by financial indicators) with large government intervention (monitored by GDP). This was made possible by the productivity gains from Fordism, also managed with the help of these indicators. Regardless of these indicators' intrinsic characteristics, their success seems to be mainly due to the historical consistency of the objectives they aim to measure.

In current post-Fordist times, the shared objective of increasing market value still remains, but the role of GDP and financial indicators has been reduced. At the micro level, as Fordist organisation still exists in many industries, traditional financial indicators are still relevant tools for management and evaluation. However, they started being challenged through changes in competition and management practices during the 1980s. Financial indicators

have progressively been criticised as being backwards and too general and providing short-term or incorrect incentives. Meanwhile, changes in the nature and intensity of competition (which implied, for instance, strategies of product differenciation instead of mass production) have stressed the need to evaluate non-monetary drivers of success (Ittner and Larcker, 1998). Intangible assets such as market share, customer satisfaction, retention… have therefore been integrated into management control practises. The Balanced Scorecard of Kaplan and Norton (1992) has been a representative indicator of this shift. More recently, social and environmental indicators also became key performance indicators. At the macro level, productivity gains and economic growth have reduced since the 1970s and post-Fordism, and new challenges such as unemployment and competitiveness became critical (Gordon, 2017). Keynesian economics, which made great use of national accounting, have also declined since that time and GDP has been increasingly criticised for its improper account of various economic, social and environmental issues (Gadrey and Jany-Catrice, 2012). GDP is still a central economic indicator, but other measures such as employment rate or competitiveness indicators are also dominant.

Existing links between national and business accounts

In addition to the historical link between GDP and business level indicators, a second element of consistency in traditional accounting consists in the construction of GDP based on business data. GDP, which is the annual economic production of a country evaluated at its market value, can be calculated in three ways: the added value of different production units, the total income of economic agents, or the sum of their final expenditures. The calculation of GDP at the production level offers the clearest view of its link with the business level. GDP is calculated as the sum of value added produced in the economy, mainly by business, the remaining being produced by public administrations and, to a lesser extent, by households. Their production is defined in the SNA 2008 as their value added, which is, in the case of business, the difference between their total revenue and intermediate consumption (European Commission et al., 2009). GDP is thus linked to the value added from numerous micro level agents, among which businesses count for a large part. This accounting link between GDP and business value added highlights the coherence of the pursuit of economic growth by both governments and businesses (i.e. value added growth), even if the concept of value added is not really used in business' daily management. This consistency is also present in the similarity of national and business account structure and framing. Both use the traditional double-entry bookkeeping principle (Nassimbene, 1954), a common accounting unit (money), and identical basic concepts of economic production, consumption and depreciation. National accounting mirrors the

structure of the profit and loss account as well as the balance sheet (note that GDP is a flow and therefore mimics only profit and loss account).

It should be stressed that this theoretical alignment of macro and micro accounting frameworks has only moderately affected the way GDP is effectively calculated. To show this, we need to understand the practical issues of GDP's formation. National accountants have two main ways of obtaining data on business production, investment, sales, turnover, purchase of goods and services or acquisition of capital goods…

Firstly, data is gathered through business surveys. A representative sample of businesses is surveyed to attain information on their activity. This survey method has the advantage of including a large range of information. Moreover, they are framed in national accounting categories, which facilitates GDP calculation. Secondly, national accountants make great use of tax returns, or of any other administrative data businesses have to report (*e.g.* social security contribution). Administrative sources do not provide all the information needed for GDP calculation but provide data with a reasonable quality, broad coverage, rapid availability, and frequent updates. This business data is compiled and adjusted in order to produce numbers for output, intermediate consumption, compensation of employees, taxes and subsidies on production, etc. In the majority of countries, GDP is largely built on these two data sources (surveys and administrative data).

One issue in terms of micro-macro articulation is that the concepts used in national accounting and in business accounting are similar but not identical. As accounting has been designed to fit each user's need, there is a slight difference in accounting conventions at the macro and the business level (Meyer, 1969). One main difference concerns the concept of value: business accounting is mainly based on the evaluation method of 'historical cost accounting' (Richard, 2012). It means that a good or an asset will be valued based on the expenditures actually incurred to develop it, even if it was produced long ago[1]. On the contrary, at the macroeconomic level (SNA 2008), the value of goods and assets is determined by their market value ('fair value accounting'). Moreover, depreciation calculated for tax purpose at the business level may be arbitrary and not coincide with the macro level measure of consumption of fixed capital. Differences in terms of accounting conventions mean that if we add up all micro level variables, we would not reach the exact macro-level ones.

[1] The most recent international norms on business accounting (IFRS) do not recommend the use of the historical cost accounting method, but rather the market price (fair value accounting). This demonstrates evolution towards a micro-macro similarity.

A second problem is that due to the multiple types of businesses (financial, non-financial, subject or not to value added tax, large vs small business…) and the practical difficulties of gathering data, business data can be incomplete and estimations or additional surveys must be performed. It is not as simple as one 'business value added' variable extracted from a unique source and calculated to obtain GDP. In terms of indicators, it means that the link between business level indicators and macro level indicators is not straightforward. It only occurs through the whole system of national accounting and is facilitated through intermediary steps to adjust accounting conventions. This does not constitute a problem *per se*, but undermines the idea of a direct articulation.

Finally, it should be stressed that the articulation of national and business accounting has rarely been an important topic for accountants or economists. Before the Second World War, linking of business data was a blind spot and its first discussions originated in 1945 (Vanoli, 2005, Comim, 2001 in Walker, 2008). At the beginning, GDP was mainly calculated based on income. The use of business data came about in the course of its institutionalisation, in order to increase the reliability of estimates by diversifying data sources. Even in the late 20th century, the absence of business accountants at the 1993 SNA / 1994 ESA was a symptom of the lack of collaboration between the two levels (Jones, 2000 in Walker 2008).

Note that, in some countries, the articulation of accounting frameworks is greater, even if the weaknesses mentioned above remain. This is typically the case of French national accounting and the countries it inspired: Belgium, Spain, Peru, Dominican Republic… Since 1967 in France, business accounts have been directly used to build macro level aggregates, on top of surveys and administrative data (Lande, 2000; UNSD, 2000; Vanoli, 2005). In this framework, categories of businesses have to report yearly standardised excerpts from their accounts, combined with their income statement. These are then aggregated at the sector level to build sector accounts. The adjustment from business accounting conventions to national accounting conventions are realised at the sector level. After these adjustments, sectoral data is aggregated to produce national accounts. This way of gathering data provides the strongest link between macro and micro level accounting. On the contrary, it is slow and can be complicated to implement for reasons of confidentially, availability, or delay of data centralisation (UNSD, 2000).

In summary, the articulation of GDP and financial indicators is strong in theory, but limited in practise. GDP and financial indicators measure similar elements (value generation), express this measure in a similar way (monetisation, accounting structure), and within a coherent system (managing Fordism, post-Fordism and institutionalised compromises). This permits a systemic coherence: when businesses have good financial performance, it is positively and fully reported in GDP. But the practical articulation of both levels of traditional accounting is not as strong as anticipated: GDP is rarely

based directly on business accounts, the aggregation of micro level data can be complex, and it uses accounting concepts similar but not identical to business level ones. This being said, the use of business data in the construction of GDP provides frequent data of reasonably good quality. The two main interests of the articulation of GDP and business indicators are thus systemic coherence, as well as data gathering.

Which insights from this analysis of the micro-macro articulation of traditional indicators and accounting can inspire the development of beyond GDP and businesses' social and environmental indicators? Firstly, it is important to recall that traditional accounting (macro and micro) always struggled with standardisation, as do alternative indicators today. National accounts used to be very different across countries for decades. Harmonisation still gives substantial margins for flexibility and adaptation to local contexts. At the business level, accounting still differs across countries but also across businesses, even if some harmonisation processes have been driven by practise, political will and globalisation (Camfferman and Zeff, 2007). Today, if some standardised data exists, it is because the law imposes it (mostly for tax purpose) or because surveys are financed. This means that advocates of alternative indicators should not be too concerned with standardisation. Differences between accounting frameworks are normal and in most cases necessary. Harmonisation or standardisation will eventually appear in use of indicators if there is a political or a user's need.

A second insight from GDP's story is that traditional indicators became dominant despite all of their methodological flaws and the absence of standardisation. The main factor in their success was the success of the goal they helped monitor (the generation of market value), which became central at a point in history. It is thus not the intrinsic technical quality of GDP (which was imperfect) which was deciding, but its context of emergence. In this regard, alternative indicators often point towards a clear goal (a happier and more sustainable society), which is considered crucial by many. This goal has not yet proven to be consistent with the interests of dominant actors at the business or the national level, which could explain the lack of institutionalisation (Whitby et al., 2014).

Thirdly, this means that the role of accountants and scholars working on indicators is limited in explaining their success. They can hardly generate phenomena such as Fordism or institutional compromises, which originate from other sources. In the history of the articulation of national and business accounting, what could be influenced by such actors was the adoption of similar concepts and accounting principles and the formation of GDP from business data. Scholars working on a better articulation of alternative indicators at both levels should then work on such elements, that is, the concepts used at the business and the macro level, as well as the articulation of data collection.

Changing businesses' priorities and the articulation of business and government action will ultimately be defined by social and political actors.

4 What is the articulation between Beyond GDP and businesses' social and environmental indicators?

Beyond GDP and businesses' social and environmental indicators share the same context of emergence. The trespassing of planet boundaries (Steffen et al., 2015), the rise of inequalities in OECD countries (Piketty, 2014; Brian, 2015) and other burning issues caused a growing interest in social and environmental change. Both governments and businesses developed such measures, driven by intrinsic motivation or by external pressure. Despite this similar context of emergence, most beyond GDP and businesses' social and environmental indicators have been created without any link between them. If traditional indicators improved their consistency and their data gathering through articulation, it is worth observing the potential for alternative indicators to do so as well.

Recent developments provided examples of attempts to articulate beyond GDP and businesses' social and environmental indicators. Bearing in mind insight from the history of traditional indicators, we analyse two of these attempts in this section, carried out around Gross National Happiness (GNH) and Sustainable Development Goals (SDGs). The objective of this analysis is to highlight the specific type of articulation that can exist between alternative indicators at both levels.

The first attempt to articulate beyond GDP and businesses' social and environmental indicators appears to have been realised by the Wuppertal Institute in 1998 (Spangenberg and Bonniot, 1998). They proposed a Corporate Human Development Index (CHDI), inspired by UN's Human Development Index (Ul Haq, 1995). This indicator is mentioned for historical purposes only, as no evidence was found of its use by businesses. As it follows the same logic as the two others, it will not be discussed.

Gross National Happiness

A second attempt of macro-micro articulation of indicators was executed by the Center for Bhutan Studies (CBS). The country of Bhutan has a long history of implementing public policy with regard to the search for happiness. During the 2000s, the government decided to develop an index to help monitor this goal. In 2010, CBS released the Gross National Happiness Index (GNH), with the goal of measuring the progress of the country towards the societal foundations of happiness (Ura *et al.*, 2012). The GNH index measures performance in nine domains considered to be core aspects of happiness: psychological well-being,

health, time use, education, cultural diversity and resilience, good governance, community vitality, ecological diversity and resilience, and living standards. These domains are subdivided in 33 indicators, based on 124 variables. The domains and indicators are aggregated into one single figure using a modified version of the Alkire-Foster method (Alkire and Foster, 2011). The index therefore allows observation of the evolution of each domain in the global GNH index as well as the thirty-three indicators.

The interest in Bhutan's GNH is to include a GNH indicator for businesses. In 2017, CBS developed a 'GNH of Business' which is a reporting tool meant to be the micro level counterpart of the GNH index (Zangmo *et al*., 2017; Wangdi et *al*., 2018). This tool can be used voluntarily by businesses in order to integrate GNH values into their operations. A good score leads to obtaining a certification, which could be accompanied in the future by government-provided benefits, such as tax cuts or access to public procurements. The main element of concern is that the micro level indicator is based on the same nine domains as the macro level GNH index, as it is shown in Figure 1.

Figure 1. Common domains of the GNH index and GNH of Business.

Source: Zangmo *et al.* (2017)

The aggregation method based on a modified Alkire-Foster method is also identical to the one used at the macro level. The main difference is that the nine domains are subdivided into 49 indicators (instead of 33), based on 216 variables (instead of 124), considered more relevant at the corporate level. The

value of the single final number of both indicators also has a different meaning. On the macro level, it is used to observe the percentage of the population which can be considered happy (according to various degrees of happiness). At the business level, it is used to determine whether or not the business can be certified as really contributing to GNH.

Having a closer look at the domains reveals that even if domains are similar, the precise measures they encompass are not necessarily related. Table 2 shows this for the domains Ecological Diversity And Resilience and Living Standards. Note that the previous comment can be generalised to all nine domains.

Table 2. Two domains of GNH Index and GNH of business

	GNH Index indicators	**GNH of business indicators**
Ecological diversity	Perceived ecological issues	Emission assessment
	Feeling of responsibility towards the environment	Solid waste assessment
	Wildlife damage	Environmental volunteerism
	Urbanisation issues	Environmental donation
		Eco-products and services
Living standards	Household income	Pay and allowances
	Assets	Workers' satisfaction with pay
	Housing quality	Retirement benefits
		Paid leave
		Fringe benefits

Sources: Ura *et al.* (2012), Zangmo *et al.* (2017)

Similarities can be found between several issues present in macro and business indicators. Designing eco-products would probably reduce the magnitude of Perceived Ecological Issues. Higher pay or retirement benefits would probably increase Household Incomes. In these cases, better performances at the business level would impact macro level measures. However, for certain cases, there is no link at all between the variables at both levels. Hence, worker satisfaction does not have a direct impact on Household Income, Assets Or Housing Quality. Also, urbanisation issues such as traffic jams are not impacted by variables present in the business indicator.

When there is a correspondence between the two levels, it is not always possible to obtain the macro level value as an aggregate of micro level variables present in the business indicator. For the GNH domains present in Table 2, only

the macro level Household Income could be approximated by adding up Salary, Retirement Benefits, Paid Leave and Fringe Benefits. For all other variables, the causal link between the micro and macro value cannot be guaranteed.

In the practical construction of GNH, note that data used to build the macro level GNH index is not based on business measures such as business surveys or tax returns as in the case of traditional accounting. It is obtained by directly surveying individuals. This is also the case for the Household Income measure or Assets.

In summary, a thematic connection exists between variables of the two indicators. This, however, does not ensure that better business performance will be positively carried over at the macro level (except for Pay And Allowances). The possibility for this depends on the complex interactions between the variables at each level. The general goal and domains' headlines are thus similar, but the consistency of the variables is not guaranteed.

This does not constitute a problem *per se*, but it reveals a looser articulation than in traditional accounting. The articulation of the two GNH indicators is only achieved through a common objective and framework (GNH), common domains, a common aggregation method, and the same emitting organisation. This different way to articulate the two levels than in GDP's case will be discussed further in Section 5.

Sustainable Development Goals

A third set of macro and business indicators created around the 17 Sustainable Development Goals, was launched by the United Nations in 2015 (UN, 2015). The UN's objective was to 'end poverty and hunger […] protect the planet […] [and] ensure that all human beings can enjoy prosperous and fulfilling lives' (UN, 2015, p. 3). As these goals are accompanied by targets, they constitute a dashboard at the international level. Yet the UN has not been charged to operationalise the SDGs, this task belonging to governments, civil society, and the private sector. Indicators have thus also been developed at these levels.

In order to implement the SDGs nationally, approximatively 35% of countries developed national SDGs dashboards (Sachs *et al*., 2018). The Bertelsmann Foundation and the Sustainable Development Solutions Network have produced a synthetic SDGs index, accompanied by dashboards, every year since 2016 (Sachs *et al.,* 2018)[2]. Finally, various business initiatives are aimed at providing indicators to monitor businesses' procedures with respect to the

[2] They also published SDGs dashboards

SDGs. The most important of them has been the development of a 'SDG compass' for business in 2015, by GRI, Global Compact, and the World Business Council for Sustainability (SDG Compass., 2015). It has been updated and completed since that time (GRI and UNGC, 2017), and numerous businesses now refer to SDGs (Littlewood and Holt, 2018).

In this paper, Sachs *et al.* (2018)'s SDGs index is shown as a paradigmatic example of macro level SDGs measures, as it evaluates most UN countries with a single methodology. How are the SDGs index and the business SDGs Compass articulated?

The SDGs index is a beyond GDP indicator which aims to measure each UN country's performance in contributing to SDGs. Its domains are the 17 SDGs, covering social, economic and environmental issues (see Figure 2), which are subdivided into 88 variables. The variables are aggregated into domains using an arithmetic mean, and the domains are aggregated into one single figure also using an arithmetic mean. This index is mainly used to rank countries according to their performance in achieving the SDGs. Note that the index has been accompanied by other tools, such as the country's dashboards, of which the role is to show whether or not a country's performance is on the right trend.

Figure 1. Common domains of the SDGs index and SDGs compass

The SDGs compass is a reporting tool for businesses that aims to measure their contribution towards the 17 Sustainable Development Goals (SDGs). For each goal, it provides a large set of relevant indicators at the business level. For instance, to reach the first SDGs goal (end poverty in all its forms everywhere), more than 60 business level indicators have been proposed. Among them are indicators such as wage level, indirect economic impacts, women clients as a

percent of total clients, or initiatives taken to enhance financial literacy. These are regrouped under the 17 goals. The SDGs compass does not seek any aggregation, be it at the goal level or in a final unique number, which allows it to be characterised as a dashboard. The SDGs compass differs from SGDs index (and from GNH certification) by its large list of proposed indicators and its flexibility (open list and non-mandatory character). This flexibility allows the choice of the most relevant indicators according to the business's strategy. It can also lead to cherry picking and a focus on the best performances. This is important, because if micro-macro consistency relies on the sharing of a similar objective, the fact that SDGs compass can be appropriated by businesses with a potentially very different focus decreases the probability of reaching an overall consistency.

As in the case of GNH, the similarity between the macro and the micro indicator takes place at the level of the general objective (happiness/sustainable development) and the structuring around identical domains (nine domains/ seventeen goals). However, the aggregation method only applies to the macro level, and the emitting organisations differ, even if they all belong to the UN network. A closer look at some variables also highlights the differences between the macro and the micro level (see Table 3).

Table 3. Two domains of the SDGs Index and the SDGs compass

	SDGs Index	**SDGs Compass**
Goal 1: end poverty	Poverty headcount ratio at $1.90/day	Presence in poor areas
	Projected poverty headcount ratio at $1.90/day in 2030	Client retention rate, by gender
	Poverty rate after taxes and transfers	"Do major employers along the value chain [...] negotiate wage and benefits standards through collective agreement?"
		"Does the Company [...] ensure[s] that small-scale suppliers, smallholders and/or distributors are paid a fair price?"
		…
Goal 13: combat climate change	CO2 emissions	CO2 emissions (scope 1, 2 or 3)
	Imported CO2 emissions	Building energy efficiency
	Climate change vulnerability	Electricity consumption
	CO2 emissions embodied in fossil fuel exports	"Does the Company engage in initiatives that promote resilient practices?"
	Effective carbon rate from energy	...

Sources: Sachs (2018), SDGs Compass (2015)

In some cases, there is a real attempt at articulation, such as in the CO2 emissions line, which is common to both indicators. But as in the GNH example, there is not always a similarity between macro and micro variables in corresponding domains. Hence, most variables present in the SDGs compass (more than 1500 in total) are not measured at the macro level. The presence of process variables can be observed at the business level (formulated as questions), which provide qualitative information. Such variables are often very relevant measures for the business level, but they do not correspond very much at the macro level.

In summary, despite the differences between GNH's and SDGs' approaches, some overlap is present. On the one hand, these indicators exist after an objective has been set, which is an essential step from the point of view of collective action. They draw their framework from this objective, as well as their domains and their name. This brings about the adjustment of priorities

towards a similar outcome, both at the macro and the business level. On the other hand, even if the domains are similar, there is no guarantee that a better performance at the business level will be translated into a better performance at the macro level, due to the use of different variables. This is the main difference from traditional indicators.

5 Theorising the articulation of a macro and a business indicator

The analysis of GDP and traditional business level measures show their specific macro-micro articulation. On the one hand, GDP is the sum of micro level value added. On the other hand, the way national accounting is built is similar to the way business accounting is organised (except for in public administration). In the case of alternative indicators, most macro level measures are not the exact sum of micro level ones. An articulation of macro and micro indicators exists through the existence of common domains and objectives.

Two types of articulation between a macro and a business indicator

This research suggests the existence of two distinct manners by which micro and macro level indicators are articulated, one mostly present in traditional indicators, the other in alternative ones. The first is the most demanding and we will call it an 'accounting articulation'. A micro and a macro level indicator will be considered articulated on an aggregative point of view if they measure the same element at different levels. This implies that the macro level measure is the sum of the micro level one[3]. GDP and business value added are articulated this way, as GDP is the sum of micro level value added. This is also the case for several variables present in beyond GDP indicators such as carbon emissions, solid waste emissions, water use, employment, etc. These variables can be accounted for both at the macro and the micro level.

A second type of micro-macro articulation is what we call a 'conceptual articulation'. The elements to which measures refer may be different, but they are expressed in a similar way. This is the case with the use of common concepts and symbols, theoretical backgrounds, structure of indicator, domains, aggregation methods, emitting organisations... This type of articulation is the one existing in the set of indicators created around GNH and SDGs. The structuration around a common set of domains seems to be the core of such

[3] Possibly after certain corrections if accounting conventions differ at both levels

articulation. For instance, the domain 'health' can be measured at both levels, with a 'sick leave' variable at the business level and with a 'life expectancy' variable at the macro level. Hak named these categories 'headline indicators', (Hak et al., 2016) but we prefer the term domains. This type of articulation is the one which will most probably characterise the future of the field of beyond GDP and business social and environmental indicators. Traditional accounting is also characterised by this type of articulation, while the concepts and the structure of national accounting mimic those of business accounting.

In summary, indicators can be articulated at the level of the element measured (accounting articulation) or the domain which is related ('field' or 'domain', 'sphere' articulation). In practise, sets of indicators that are articulated from an accounting point of view often share the same concepts, symbols, and goal, whereas the reverse is not true.

While GDP and traditional accounting have both an accounting and a conceptual articulation, current alternative indicators mainly have a conceptual one. But can this statement be generalised to all possible future beyond GDP and CSR indicators? In other words, are there any theoretical limits to an accounting articulation of alternative indicators?

Are there theoretical limits to the articulation of alternative indicators?

The core characteristic of alternative indicators is to introduce a variety of social and environmental variables. Does this variety hamper articulation at the macro and the micro level?

Conceptual articulation requires the use of a common framework at both levels. In theory, developing such a framework is always possible. In particular, the use of a common name, common domains and the construction around a like objective does not face any theoretical limit. Therefore, any indicator developed with macro-micro articulation as an objective could reach such conceptual articulation, no matter the type of social and environmental variables it includes.

On the contrary, reaching an accounting articulation for all social and environmental variables faces more difficulty. It would require measuring the same elements at both levels and for each variable (*e.g.* the number of employed workers), and our claim is that such task would be irrelevant and impracticable.

Firstly, it would be unfeasible because several variables measured at the macro level cannot be translated at the business level. Most macro level variables can only be translated at the micro level as properties of business stakeholders, such as employees or suppliers, but cannot be attached to the business itself. For instance, a wage policy is a policy of the business, and CO2 emissions are productions of the business. On the contrary, life expectancy, life satisfaction, poverty or obesity – which are frequent macro level variables – are characteristics of some stakeholders of this business (even if they are influenced

by a business's practise). Measuring life expectancy, life satisfaction, poverty or obesity at the business level can be tempting but would have little meaning or interest. This is more relevant at the individual level. This difference of entity subject to the measure imposes some adjustments in the element measured, if one intends to produce meaningful results. Conversely, this contradicts the definition of an accounting articulation.

Secondly, reaching an accounting articulation for all social and environmental variables would be irrelevant because it would hamper the diversity of measurement practises. It is generally admitted that indicators have to be designed to be useful to their users and their strategy (Innes and Booher, 2000; Jesinghaus, 2012; Rinne et al., 2013; Searcy, 2016; UNSD, 2015). Hence, there is an interest in having measures closely related to users' needs, and thus to favour diversity – between the macro and the business level, and between different businesses. In this respect, beyond GDP indicators typically encompass output variables, which are results that can be measured or assessed directly (Clark *et al*., 2004). Some examples of this are the average number of years of education, CO2 emissions, number of protected areas, crime rate, income inequality… Beyond GDP indicators also make great use of outcome measures, which are the ultimate priorities that the world faces today (e.g. life expectancy, biodiversity, child poverty…). The business level frequently uses other types of measurements, namely process and impact. Process variables aim to assess if a certain protocol is followed (*e.g.* 'Is there a plan to improve health at work?'), where impact assessments aim to determine '*the portion of the total outcome that happened as a result of the activity of the venture, above and beyond what would have happened anyway*' (Clark *et al*., 2004, p.7). Process variables are largely present in GNH of business and in the SDG Compass. This is because they supply qualitative information desired by managers or external stakeholders. On the contrary, beyond GDP indicators rarely include process variables. If impact assessments are not found in these indicators, they are the reason for several other initiatives such as the Social Return On Investment (SROI). Due to this diversity, standardising a closed list of variables among businesses to articulate them with the macro level would drastically reduce the relevance of alternative indicators. Moreover, as process variables cannot be aggregated at the macro level (it is not possible to get a sum of qualitative data), it would lead to indicators encompassing only output and outcome variables. Even in traditional accounting, similar issues occur. There is no translation of all business level indicators (ROI, EVA…) at the macro level and vice versa.

Thirdly, an accounting articulation for all variables would raise the issue of identifying causality (Emerson, 2003, Rossi et al., 2018). If one wants to analyse the impact of a soda company on life expectancy, how can it be assessed? The establishment of causality would require the measurement of the impact of soda consumption on (for instance) obesity, as well as the impact of obesity on life expectancy. Such impact assessment should also consider

eventual context effects, plus the part of responsibility held by the consumer in his or her choices. It should also include the fact that these choices are influenced by the advertising methods of the soda company. Assessing such impact is not an easy task. To facilitate it, accounting conventions could attribute values to some parts of these causality channels, an already frequent practice of traditional accounting (Vanoli, 2005). A proper impact assessment would nonetheless still be necessary. In this respect, econometrics and other assessment methods can help the establishment of causal links. Unfortunately, they are costly and to some extent, inaccurate when the issue is complex. In traditional accounting, this problem is avoided because only market value is measured at both levels. One variable from the business level is transposed as it is at the macro level, without further consideration for impact. Hence, business externalities which impact GDP are not considered in GDP's calculation, only direct value added is.

One way to avoid this causality issue among alternative indicators would be to get rid of the search for impact and rather consider accounting aggregation only for pairs of variables which are identical at both levels. Additional interactions needing the establishment of causal links would not be taken in to account. In practise, accounting articulation would consider only variables such as the number of employees, revenue, carbon emissions…, which are present as such at both levels. The impact of a soda company on life expectancy would not be assessed. Included variables would be mainly output variables, even if this solution also works for several outcome variables (*e.g.* subjective satisfaction at work). This does not mean that impact assessment should not be carried out on an individual business basis. At least, not in order to build macro level accounts.

Due to these three reasons, it is not possible to articulate all variables of current alternative indicators from an accounting point of view. This constitutes a limit to an ambitious micro-macro articulation of indicators, and some weaknesses compared to traditional accounting.

Which variables to articulate on an accounting point of view?

It has been shown that a full accounting articulation is impossible for all social and environmental variables. Although, is it necessary in order to fulfil our initial goal – helping the coordination of ideas, actions, and evaluation towards a socio-ecological transformation? On the one hand, reducing the scope of possible accounting articulations also reduces the practical interest of articulated indicators. On the other hand, history shows that the consistency between GDP and business financial indicators is not only an accounting aggregation. It is also due to a strong conceptual articulation. In the design of alternative indicators, it is still possible to articulate some variables from an accounting point of view, even if not all of them.

The way to articulate macro and business levels indicators would thus consist in a mix: indicators including many variables, with only some of them articulated through accounting articulation. Which would these variables be? In other words, what would be the specific conditions under which an accounting articulation is possible?

Firstly, the information measured should be a characteristic of both the business and the macro level. This means articulating variables such as carbon emissions or work satisfaction, while discarding variables like life expectancy, life satisfaction or obesity at the business level. This condition is by far the most demanding.

Secondly, the variables should not be process or impact assessment variables. As shown, these types of variables are very difficult or almost impossible to aggregate properly. Output or outcome variables should then be the subject of accounting articulation.

If we apply these conditions to the variables present in indicators such as GNH and SDG, we can exclude most variables present in these indicators, as shown in Table 4. For the sake of concision, only a subset of the variables present in these indicators are shown.

Table 4. Can these variables from GNH and SDGs be subject to accounting articulation?

	Social	Environmental
Yes	Wage gap	CO2 emissions
	Wage gap by gender	Imported CO2 emissions
	Ratio of female to male labour force participation rate	SO2 production
	Working hours	Nitrogen production
	Job satisfaction	Freshwater withdrawal
No	Life expectancy	Feeling of responsibility towards the environment
	Adult literacy and enrollment	Wildlife damage perception
	Poverty headcount ratio	Perceived ecological issues
	% internet users	Urbanisation issues
	University rankings	Climate change vulnerability
	Housing quality	
	Life satisfaction	
	Positive emotions	
	Good (public) governance	
	…	

This table shows that most variables present in the two selected indicators are unfit for a systematic accounting articulation. It also shows which variables could be included in indicators aiming to have an accounting articulation. Among social variables, most of those which fit are in fact traditional socio-economic variables. Among environmental variables, emissions and consumption are the most feasible for accounting articulation.

A third criterion that could be added would be the relevance for users: for which of these variables is it relevant to reach an accounting articulation? If gathering the information for such articulation has a cost, it should be done when the information will effectively be useful for business and government. For which variables in Table 4 would this be the case? It seems that with the climate momentum started in 2018 in several countries, variables of climate change such as carbon emissions are of particular interest both at the macro and the business level. Users at both levels can find an interest in an accounting articulation for carbon emissions. It would allow businesses to develop more precise science-based targets by using macro level requirements on carbon emissions (while the measurement would be the same at both levels). And it would also permit better comparisons of businesses as in the case of best in

class rankings. In addition, it would allow governments to have access to better data on carbon emissions, directly derived from businesses (and not from estimations). This improved data would be mainly useful for governments as they are key elements of a carbon emissions reduction strategy. In this respect, a strategy of quotas on carbon emissions by sector could be a start. This would require precise data on the carbon emissions in each sector, which could be provided by businesses. In this case, the compulsory measure of carbon emissions by businesses would be useful for both businesses (to improve science-based targets and benchmarking) and for governments (to monitor a quota policy).

If the political momentum on climate change is prolonged to other environmental issues, other variables could be relevant for an accounting articulation. A detailed list of accounting references focusing on environmental issues has been proposed by Schaltegger (2018). This list, which includes freshwater use, chemical pollution, nitrogen accounting… can be a base of issues on which it is possible to develop an accounting articulation between the macro and the business level.

6 Conclusion

The research presented in this paper has shown that the micro-macro consistency of traditional accounting has mainly been derived from the interweaving of the global issues it aimed to monitor, be it Fordism, growth or institutional compromises. The use of similar concepts both at the macro and the business level ensures a conceptual articulation, while the measure of similar elements at the two levels establish an accounting articulation. However, the overall articulation of GDP and business financial indicators has nonetheless been limited. One the one hand, different accounting conventions have been formed at both levels. On the other, main indicators for daily monitoring of businesses have never had any link with the macro level.

From the results of this analysis, it seems probable that a better articulation of beyond GDP and businesses' social and environmental indicators would be subject to the same process. That is, being articulated around a common goal, and being characterised at various degrees by conceptual and accounting articulation. Sustainable development and its current avatar – SDGs – constitute an increasingly shared goal. As both macro level actors and businesses can act upon this, it gives room for articulation of actions and of indicators. This paper claims that a better articulation of beyond GDP and businesses' social and environmental indicators could, as in the case of traditional accounting, consider a mix of methods, some variables being common to both levels on an accounting basis, with others being specific to only one level. For the former group, a list of possible variables has been presented in the previous section.

While for the latter group, the choice of variables should be made in accordance with the user's or developer's wishes. In this case, the important issue is to frame the indicator in such a way that the same domains, symbols and name are used at both levels.

The fact that a full accounting-based articulation is considered impossible and irrelevant should not be overly seen as a weakening of the potential of a micro-macro articulation. In particular, it should not overshadow the practical interest of a conceptual articulation. Recalling the reasons why a business-macro articulation might be positive, several of them can be reached with a conceptual articulation only. It might already provide improvements in the coherence of ideas, actions, and evaluation between various levels. This is good news, because reaching an accounting articulation is more complicated and more costly than a conceptual one. An accounting articulation should be limited to the fields for which its benefits – the possibility to produce better macro level data and to use the same targets at both levels – exceed its costs. This might be the case for carbon emissions today, or for the wage gap, if fighting inequalities become a priority at the business level. The two types of articulation are thus complementary.

As a conclusion to this paper, the recommendations that have been made throughout are summarised. These could be useful in the evaluation of current non-monetary indicators or in the creation of new ones. In sum, a better articulation of beyond GDP and businesses' social and environmental indicators could take this form:

1) Constructing indicators around a goal (such as GNH, SDGs…) which has the potential to gather macro and micro stakeholders.
2) Designing indicators around domains which are common to the macro and the business level.
3) Using the same concepts, symbols, aggregation methods… at the macro and the business level.
4) Not seeking a standardisation of variables across levels or across businesses, but using the most relevant variables for users.
5) Using accounting articulation only for a subset of variables of the indicator, such as carbon emissions or the wage gap.
6) Using consistent targets at both levels to reflect common ambitions.

This would permit minimising costs of a better articulation of indicators, while maximising its benefits for businesses and government.

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