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How to fix ESG reporting

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"How to Fix ESG Reporting"

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Abstract

Investors, advocacy groups, academics, and the 200 CEOs of the US Business Roundtable have asked corporations to take on an added purpose beyond a narrow pursuit of shareholder value. In response, many companies now issue ESG (Environmental, Societal, and Governance) reports. These reports, however, are so broad in scope that they fail to address the unique measurement challenges within each of ESG's constituent components. Moreover, the breadth of ESG reporting allows corporations to gloss-over (implicit) moral tradeoffs when their actions improve one of the reported ESG metrics (such as GHG emissions from its truck fleet) but worsen performance for an unreported metric (indentured labor used to mine minerals for electric vehicles' batteries). Many ESG reports selectively present only those non-financial metrics favorable to them.

We propose improvements in ESG reporting by focusing on dimensions where broad societal agreement already exists about the preferred outcomes from corporate actions, such as reducing greenhouse gas (GHG) emissions and avoiding use of indentured labor in supply chains. In particular, we introduce a new and comprehensive system, based on well-established accounting practices, for reporting and transferring GHG emissions across corporate supply and distribution chains. This system eliminates the measurement problems in the current, widely used GHG-reporting standard, especially the feature that requires multiple counting of the same corporate emission. The new approach generates ESG data that are relevant and reliable, enabling better disclosure, governance, and auditing of corporate ESG performance.

Investors, advocacy groups, academics, and even business leaders themselves, including 200 CEOs of the US Business Roundtable, have asked corporations to take on an added purpose beyond the pursuit of shareholder value. They want companies to become environmentally and socially accountable by reporting on a broader set of metrics than just those on income statements and balance sheets. In response, many companies, including 58% of companies in the S&P 500 Index, now issue ESG (Environmental, Societal, and Governance) reports, guided by voluntary standards set by multiple and often competing standard-setting bodies.[1] New investment vehicles and investment advisory groups have been created to direct investors' funds to companies performing well according to these published ESG metrics.

ESG in its current form, however, is more a buzzword than a solution to the expanded demands for information on corporate performance. ESG, unlike other three-letter acronyms for management innovations, such as TQM, JIT, and BSC, is not a single concept. Each of ESG's three domains has unique measurement opportunities and challenges, a nuance that ESG advocates rarely acknowledge. The common element that unites E, S and G into a three-letter acronym is that none is a financial metric. But developing a reporting, evaluation, and investing system for metrics united only by what they are NOT is hardly a recipe for success.

Indeed, the absence of a common framework for the E, S and G elements produces contradictions even within a single ESG report. Consider a company under pressure from stakeholders to reduce the greenhouse gases emitted from its fleet of fossil-fueled vehicles. The company switches to electric vehicles, leading to a lower ESG-reported carbon footprint. But what if the raw materials suppliers for the electric vehicles' batteries used 3TG conflict materials – tin, tantalum, tungsten, and gold – forcibly mined by indentured prisoners?

Similarly, consider a company that has been criticized and excluded from investment portfolios because its ESG report indicated a high incidence of workplace accidents. The company solves this problem by a combination of automation and outsourcing. Its next-year ESG report shows many fewer workplace accidents, but, likely unmeasured and unreported, are the loss of employment among former workers and an economic decline in its (former) local communities and supplier base.

The difficulty of reconciling across various ESG activities emanates from the challenges of objectively making the underlying moral judgments. Without a widely held consensus on the purpose of the corporation in society, judgments about what to measure, how to measure, or how to aggregate ESG data are ad-hoc and subject to manipulation. The situation places a huge burden on the auditors of ESG reports who typically solve this problem by issuing a double negative opinion, such as "We found no evidence of misreporting in the company's ESG report."

Some advocates for ESG reporting want to go further than disclosure by estimating monetary values for components in an ESG report and including each dollarized component in the company's income statement. Such an updated statement, they argue, represents a more comprehensive and inclusive measure of the true profits of a company, net of its environmental, societal, and governance footprints. But valuations of the multiple and diverse components of ESG – such as a company's carbon footprint,

[1] The standard setting bodies include the Sustainability Accounting Standards Board, the Global Reporting Initiative (GRI), the Carbon Disclosure Project, the Task Force on Climate-related Financial Disclosures, and the World Economic Forum's International Business Council.

its labor practices, employment diversity, and governance practices – are far harder to calculate than the accruals based on future cash flows that underlie basic financial reporting. Consider the decades-long attempts by some accountants just to put human resources on a company's balance sheet, attempting to quantify a CEO's statement that "employees are our most valuable asset." These efforts failed because the employee valuations are either irrelevant, such as how much was spent on hiring and training, or are arbitrary and unverifiable. Moreover, it will be even harder, if not impossible, to find a formula to *aggregate* the valuations of the diverse components of ESG: doing so would require some universally accepted ethical code to navigate the intra-ESG moral trade-offs described earlier.

The generally accepted relevance and reliability of financial accounting reflects over five centuries of development and its basis in cash, a single, well-understood commodity that is trivial to value: $1 more of cash adds $1 of value, and $1 less of cash subtracts $1. All financial accounting can be traced to measurable cash transactions in past and current periods, plus those that can be reliably estimated to occur in future periods.[2] Financial balance sheet, income, and cash-flow statements are produced by adding and subtracting cash-based components, with every item expressed in the same unit of value. While a universally agreed carbon tax may enable a translation of GHG emissions to a cash equivalent, attempting to achieve a similarly reliable translation for virtually all the other components of an ESG report, particularly its "societal" and "governance" footprints, is not currently feasible.

So, how do we move forward on ESG reporting? After all, despite the measurement challenges, the recent demands for corporate reporting on environmental and societal impacts are generally valid and understandable. The income and wealth gains from global capitalism have been accompanied by major adverse externalities, especially the degradation of the world's atmosphere, geology, and water sources. Additionally, 1 billion people, 15% of the global population, continue to live in deep poverty, defined as incomes less than $2 per day, and many other people in advanced economies have become unemployed or under-employed because of corporate outsourcing and automation.

We argue, in this paper, that ESG reporting must be based on the distinctive measurement issues in each of its dimensions to become as relevant and reliable as financial reporting. ESG advocates have impaired their cause by treating diverse non-financial performance as a single, interchangeable concept. This reductionism inhibits fundamental and rigorous thinking about how measurement is best done in each of ESG's distinctive dimensions.

Environmental (E) metrics are the most amenable for rigorous corporate reporting since they are based on objective, physical measurements of the quantities of gases, solids, and liquids that companies use and produce. Among the multiple types of environmental degradation, the potential existential threat to humanity from climate change, leads us to advocate for placing the highest priority on improving the measurement and reporting of corporate (and government) GHG emissions.

Corporate societal (S) performance along dimensions where a general moral consensus already exists – such as avoidance of slave labor anywhere in a company's supply chain – can also be communicated via a rigorous reporting system. Many other possible S metrics, however, such as the ratio of CEO to average-worker pay, require more subjective value judgments to be meaningfully interpreted. Translating these more-heterogeneous societal preferences about a company's operations into widely

[2] Even financial depreciation and amortization, which many professionals disparage as "non-cash" expenses (and also ignore by emphasizing EBITDA over net income), are calculated from actual cash expenditures in prior periods.

usable outcome metrics about societal benefits and costs is a more controversial project, as we will subsequently articulate.

Governance (G) reporting is the most conceptually muddled of the three ESG components since governance is a process, not an outcome. Good governance is valuable only if it leads to better decisions and better financial, environmental, or societal outcomes. Without outcome-based metrics for governance, advocates have defaulted to the adage "if you can't measure what you want, want what you can measure," and measure inputs, such as the diversity of board members, or compliance, such as avoiding litigation. Left unspecified is how input and compliance metrics predict meaningful improvement in corporate outcomes.

The introduction two decades ago of the ESG three-letter acronym by a UN-sponsored group of financial institutions[3] appears, in retrospect, to have taken focus away from the triple-bottom-line reporting, already underway at the time, for reporting economic, environmental, and societal outcomes. We argue that the triple-bottom-line approach is a more rigorous and meaningful way forward to address the climate emergency and other corporate societal obligations rather than attempt to rescue a conceptually-muddled ESG approach.

We already have examples of companies supplementing their traditional financial reports with non-financial metrics of company performance. For instance, the Balanced Scorecard, with measures of customer, process, innovation, and employee performance, can help managers better implement their profit-seeking strategies. Companies, including those that want to solely pursue shareholder value, can also be responsive to the external demands for improved environmental and societal performance by expanding their strategy scorecard to include "E" and "S" outcome metrics.[4]

In the remainder of this article, we delve more deeply into how to measure a company's environmental and societal performance, and how such measures can approach the rigor, relevance, and auditability of financial measures of corporate performance.

Environmental Measurement and Reporting

The Washington Post reported in April 2021 that the world is half-way to doubling atmospheric CO_2 from pre-industrialization levels.[5] Climate change due to unchecked man-made greenhouse-gas emissions may be a threat to humanity and many other species comparable to the Chicxulub meteor impact on dinosaurs. With the widespread understanding that climate change, caused by buildup of greenhouse gases[6] (GHG) in the atmosphere, is approaching irreversible and possibly catastrophic levels, sound accounting for corporate GHG performance should have the highest priority for ESG reports.

In focusing on GHG measurement, we do not deny the relevance or importance of non-GHG environmental degradations of the atmosphere, soil, water, and biological diversity. We argue, though, that it is preferable to focus on improving measurement and reporting on GHG emissions rather than to disperse resources and bandwidth by attempting to develop a theory of everything for environmental

[3] The Global Compact, *Who Cares Wins: Connecting Financial markets to a Changing World*. 2004.
[4] For more on this argument, see Kaplan and McMillan, "Reimagining the Balanced Scorecard for the ESG Era," HBR Online, February 3, 2021.
[5] https://www.washingtonpost.com/weather/2021/04/05/atmospheric-co2-concentration-record/.
[6] Greenhouse gases encompass CO_2, CH_4, N_2O, and fluorinated gases.

measurement. Also, whatever we learn about GHG measurement and auditing will likely apply and shorten the search for the measurement approaches useful for non-GHG environmental reporting.

A well-functioning GHG accounting system should motivate companies to take actions to reduce total GHG emissions in their value-chains even in the absence of government mandates or carbon taxes. Customers' willingness-to-pay for a company's reduced GHG emissions could be inferred through their purchasing decisions based on a product or service's valid GHG metric. And, if a regional or global carbon tax becomes a reality, governments would need access to a valid and auditable company-specific GHG accounting system to assess and collect it, another role for a well-functioning GHG accounting system.

GHG measurement and reporting is not only the most important priority, it is, fortunately, the easiest to implement quickly. An extensive scientific literature already exists for GHG measurement. Most articles have focused measuring GHG at a global and country level, but several articles and initiatives have focused on measuring GHG at the corporate level. In particular, the World Resources Institute and the World Business Council for Sustainable Development mobilized in the late-1990s a working group of representatives from hundreds of companies, government agencies, universities, and NGOs. The project produced a Greenhouse Gas Protocol in 2001, which has since been updated several times and is currently the most widely used corporate standard in this space. This standard classifies GHG emissions into three categories, along with explicit guidance for their measurement and reporting:

> **Scope 1:** Direct GHG emissions from sources that are owned or controlled by a company, such as from its fleet of vehicles and its production equipment.
>
> **Scope 2:** GHG emissions that occur at non-company owned facilities that generate electricity purchased and consumed by the company.
>
> **Scope 3:** Indirect GHG emissions from upstream operations in a company's supply chain and downstream, by the company's customers and end-use consumers.

Scope 1 emissions are the easiest to measure, but, for most companies, also likely to be a small percentage of their total impact on global GHG emissions. Scope 2, from electricity consumption, was carved out from Scope 3 because it is far easier to measure and trace than other sources of Scope 3 emissions. Several hundred companies already follow the GHG Protocol standards by reporting on their Scope 1 and 2 GHG emissions.

Scope 3 emissions, usually the largest source of a company's total GHG footprint, are the most difficult to reliably and comparably measure across companies and time. The problems with Scope 3 measurement can be simply illustrated by considering the challenges faced by, for instance, a manufacturer of car doors for automobiles. Scope 3 requires it to track all GHG emissions from the processes of its upstream suppliers including: (1) the metallurgical extraction of coal and iron ore; (2) the transport of the coal and iron ore to a steel producer; (3) the production of sheet steel from the coal and iron ore (and other inputs); and (4) the transport of raw sheet steel from the steel factory to its own production facility. The company must also estimate the GHG impact of downstream activities including: (1) the transport of the car door to its customer, the automotive assembly factory; (2) the manufacture

of the finished car; (3) the transport of the finished car to a showroom; and (4) the operation of the vehicle, for perhaps 15 years, by the end-use consumer.

Estimating all these upstream and downstream GHG emissions – especially for companies with long, complex, and multi-jurisdictional value chains – introduces large measurement errors and much opportunity for bias and manipulation into a company's "E" reports. Moreover, Scope 3 reporting effectively requires each company in a value-chain to estimate and report the total GHG emissions from the entire value chain, which is highly inefficient and measures the same emission multiple times over, a fundamental accounting error.

Not surprisingly, many companies avoid Scope 3 reporting entirely, ostensibly because of its measurement challenges and the lack of control over upstream and downstream emissions. In retrospect, these companies made the correct decision to ignore the request to report on Scope 3 emissions since such a report would be both misleading and an invalid way of measuring the upstream and downstream GHG impacts of a company's operations.

We can correct the dominant GHG reporting framework, especially its advocacy for including Scope 3 emissions, by applying fundamental financial and cost accounting principles to accumulate and transfer a product's GHG emissions across its supply and distribution chain. The principles are based on how a company captures the production costs from its upstream suppliers, adds its own incurred costs, and transfers the accumulated sum to its customers. Corporate accounting does not require a company, such as the car door manufacturer, to estimate all the purchase prices paid by all organizations across all the stages of its supply chain. Rather, each company records only what it pays for goods and services from its immediate suppliers and what it receives when selling its products to immediate customers.

To illustrate, assume all materials transfers are made at cost (eliminating the mark-up for profit) from stage to stage. In this case, a car door company's acquisition costs would include the cost of extracting the original materials (incurred by the mining company) plus all the labor, machining and indirect costs added to the materials as they were handled and processed by the sequence of suppliers until the materials reached the car door manufacturer. The manufacturer adds its own labor, machining and indirect costs to the purchased costs to calculate the total manufacturing cost of the door when sold and transferred, at the next stage, to the automotive assembly company. This process continues down the distribution chain until the car's eventual purchase by a consumer.

Referencing the GHG reporting protocol's taxonomy, the financial-accounting system requires every company to calculate only the cost of Scope 1 operations: its labor, machining and indirect costs, often referred to as "overhead," both manufacturing and administrative. It then adds this "Scope 1" amount to the purchase price of materials and other services, such as electricity purchases, and passes on the total to the next player in the supply chain. The same financial and cost accounting principles can be applied to GHG measurement by tracking and recording physical quantities of CO_2, CH_4, and N_2O emissions through commercial value-chains.[7]

[7] This will end up expanding the approach used for Scope 2 emissions, currently attributable only to electricity purchases, to emissions attributable to all corporate purchases.

To illustrate, start with the furthest-removed supplier for the car door company, a mining company, say in Western Australia, which extracts the coal and iron ore that eventually finds its way into the door.[8] The mining company measures its Scope 1 emissions and, using a combination of chemistry, engineering, and cost accounting, assigns its total emissions to the tons of coal, iron ore, copper, and all other minerals extracted during a period using an estimating process analogous to activity-based costing applied to a company's indirect expenses. This calculation produces an estimate of GHG emissions per ton of each type of material produced. While cost accounting treats the financial cost of a ton of material as an "asset," by recording the cost as "inventory," we can label the GHG units per ton of extracted material as an E-liability, reflecting its environmental liability to society.

When the mining company transfers its tons of coal and iron ore to a shipping company, the shipping company assumes the E-liability from the mining company onto its E-accounting books (much like it assumes the "inventory" on its financial accounting books). If the mining company transfers all materials mined in a period to downstream entities such as the shipping company, the mining company would have the same balance in its E-liability account at the end of the period as its beginning-of-period quantity.

As the shipping company's ocean barge travels from Perth, Australia to, say, Port Talbot, Wales, it adds, to its E-liability account, the quantity of GHG produced to transport the barge (e.g., the E-liability from the fuel used to power the ship's engines). The total GHG produced during the journey is allocated, by weight or volume, to the materials carried on board. At Port Talbot, if the shipping company physically transfers 38% of its ship's iron ore and 6% of its metallurgical coal to a steel producer, it will, on its GHG accounting ledger, also transfer 38% of its iron ore E-liability and 6% of its coal E-liability to the steel company, which now "owns" those E-liabilities.

The steel company, of course, incurs its own Scope 1 emissions through operation of a blast furnace and hot and cold rolling mills, to produce coils of sheet steel. Through the same E-liability accounting process, the steel mill allocates its purchased and incurred E-liability to each ton of sheet steel produced. When a coil of sheet steel is transferred to a railroad company, each ton carries its share of accumulated E-liability from the originating mining company, all transportation to that stage, plus its pro-rata share of GHG emissions from the steel production process.

When the steel coil, several days later, is processed through the receiving dock of the car door manufacturing company in, say, Solihull, England, the coil's E-liability, which has now been augmented by its per ton share of the GHG emissions from the railroad company's transport, between Port Talbot and Solihull, will be transferred to the car door manufacturing company. This process continues until the consumer, purchasing the finished car, receives both the car itself and a report on the quantity of GHG emissions used in its production and transportation. This final stage is akin to a consumer seeing nutrition information on a food item purchased in a grocery store – in many cases, the consumer's purchasing decision is influenced by this additional information. Blockchain technology, starting with the first stage of production, can be used to accumulate and transfer E-liabilities from stage to stage, reducing accounting and auditing costs across the entire system

Some companies may choose to directly eliminate GHG from the atmosphere, for instance by engaging in carbon capture or reforestation. When a company reduces GHG through such Scope 1 contra-

[8] Agri-businesses would start with the original grower, such as a plantation or smallholder farmer.

emissions, it subtracts that amount from its E-liability account, and therefore is able to transfer a lower E-liability to the next company in its distribution chain, and, eventually, to the end-use consumer purchaser. This reduction makes the product more attractive, a source of competitive advantage, when selling to environmentally-sensitive consumers.

The GHG E-accounting system requires two major measurement steps: estimate the E-liabilities the company creates and extinguishes each period, and then assign this net E-liability, together with E-liabilities acquired, to the units of output produced during the period.

For the first step, environmental engineers can estimate the quantity of GHG emissions from a company's primary-source GHG activities such as the burning of hydrocarbons for electricity, heat, and transport; industrial processes such as the making of metals, cement, glass, and chemicals; agricultural processes such as livestock emissions and deforestation or reforestation; and waste-management processes. This enables the recording and auditing of a company's E-liabilities each period.

The attribution of a period's net GHG emissions to a company's diverse set of products and services is identical to how corporate cost-accounting now uses activity-based costing to assign overhead and other indirect costs to the products and services produced during the period.

With the two measurement challenges solved, companies can report, each period, on the stocks and flows of its E-liabilities in a period, just as they report on their opening inventory, annual purchases of raw materials, finished goods produced, cost of goods sold, and closing inventory. The company would, in its environmental ("E") report, disclose its beginning of period net E-liability, E-liability acquired, net E-liability produced during the period, E-liabilities disposed (sold), and its net E-liability end-of-period balance.

Some environmental activists may fear that the transfer of a company's entire Scope 1 emissions to downstream customers will enable the company to escape scrutiny for GHG-intensive operations. But similar to how any good financial analyst looks beneath a company's net income number (the "summary statistic") to analyze cost of goods sold and changes in inventory levels, any competent environmental analyst could unpack the reported details of a company's purchase, production, and disposal (sale) of E-liabilities, not simplistically look only at the end-of-period E-liability balance. Moreover, the E-liability system does not preclude a company from reporting Scope 3 equivalent numbers, if desired. The data required to calculate any one company's Scope 3 emissions are still retained across the E-liability disclosures in its value chain: in fact, the E-liability system yields higher-quality and more auditable Scope 3 reporting than current GHG reporting practices.

The proposed E-liability accounting system has several advantages. First, it eliminates the double-, triple-, quadruple, etc.-counting inherent in Scope 3 measurement. Second, a company cannot reduce its reported Scope 1 emissions simply by outsourcing production and then refusing to estimate Scope 3 emissions because of high measurement error and lack of access to distant suppliers and end-use customers. Any GHG emissions produced by an outsourced supplier is transferred to the company when it purchases the supplier's production. Measurement of E-liabilities are incentive compatible. A company doesn't benefit from understating the E-liability it transfers to its customers because its end-of-period net E-liability would steadily increase. Conversely, a company attempting to overstate E-liability transfers to downstream customers will meet with resistance from the buyer, much the same

way that customers resist price increases they feel are unwarranted. Negotiated arm's-length transactions between suppliers and customers will deter manipulation of E-liability transfers.

The system allows for a separate materiality standard for environmental reporting, based on quantity of GHG emissions, that is entirely separate from materiality considerations for financial reporting. Currently, major ESG reporting standards require companies to disclose whenever environmental considerations pose a materially *financial* risk to a company. This allows many GHG-intensive processes to go unreported when they don't have a material impact on a company's financial statements. The E-liability system, in contrast, should use a materiality standard based on the magnitude of E-liabilities, purchased, produced, and transferred, that is separate from short- or long-term financial impacts.

Finally, a company's end-of-period E-liability balance can be audited in much the same way as its financial asset and liability accounts. The external assurer, which we advocate to be a team of environmental engineers, cost accountants, and blockchain experts, verifies the company's internal GHG measurement and allocation models, its purchases and transfers, particularly of GHG-intensive products and services, and reconcile between beginning and end-of-period E-liability balances. Auditors can cross-check a client's E-liability transaction with corresponding activity in the client's financial accounts: a "red flag" would be raised when the E-liabilities booked seem unusually small, relative to industry peers, for the scale of the client's inventory movements during a period.

Much of the enthusiasm around ESG and GHG reporting comes from those in the investing community who, arguably, want to invest for a better planet. But a mandate applying only to publicly-traded companies provides a strong incentive for public companies to go private. All companies should report on their E-liabilities, especially large private ones such as Bechtel, Bosch, Cargill, Koch, and Mars, and those financed through joint ventures, limited partnerships, and venture and equity capital firms. And public and private corporations are not the only enterprises in the world that produce GHG emissions. State-owned enterprises and government agencies, including a country's massive defense, transportation, and energy departments, also produce mega-tons of GHG emissions. GHG reporting, if important for reducing emissions, should be required of all entities, public, private, governmental, and supra-governmental.

While waiting for such legislation and regulation to occur, voluntary E-liability reporting by large companies, such as the signatories to the Business Roundtable "corporate purpose" statement[9], would enable them to put their rhetoric into practice, especially when they also mandate E-liability accounting for all their suppliers and customers. In this way consumers will see the E-liability, along with the price, of most of the products and services they purchase. The voluntary signaling of environmental performance by these major companies could create competitive advantages among consumers willing to make purchasing decisions based on reducing their personal E-liability footprint.

The E-liability system also provides the "tracks" on which a variety of carbon taxation-policy "trains" can run. Governments wanting to be in the vanguard of reducing GHG emissions can design an E-tax regime based on whose behavior, among producers, investors, and consumers, they most want to influence. The E-tax could function like a corporate value-added tax by assessing an obligation on a company's E-liability disposals less its E-liability acquisitions. Alternatively, it could tax investors by assessing the

[9] https://www.businessroundtable.org/business-roundtable-redefines-the-purpose-of-a-corporation-to-promote-an-economy-that-serves-all-americans.

obligation on the difference between a company's end-of-period and beginning-of-period E-liability amounts. It could also stimulate consumer pressure by assessing the E-tax on the E-liability total of purchased final products and services, just like a sales tax.

Societal Measurement and Reporting

Measuring a company's societal impact is even more complex than measuring a company's net production of environmentally harmful gases, liquids, and solids. "Society" is not a homogeneous entity. Different members and groups within society have different opinions and preferences about what is desirable or undesirable corporate behavior. We can start, however, with components of corporate societal performance for which a general consensus exists. These consensual components could include reducing unsafe working conditions, eliminating use of child and slave labor, and avoiding bribery and corruption. Even though complying with these notions may seem universally uncontroversial, many companies still find it difficult to avoid such violations in their multi-tier global supply chains.

For example, US and European corporate chocolate producers poured massive resources into a well-intentioned sustainability program in the Ivory Coast and Ghana, which produce 60% of the world's cocoa supply. The program's goal was to certify that cocoa production did not occur on deforested land and did not use child labor. The program trained farmers and provided them with free seedlings to replace their old and unproductive trees. Yet, as reported in a June 5, 2019 headline in the Washington Post, "Mars, Nestlé and Hershey pledged nearly two decades ago to stop using cocoa harvested by children. Yet much of the chocolate you buy still starts with child labor." The aging farmers, whose own children had left the farms to seek employment in urban centers, used the children of even poorer locals to slash and burn forested land to expand their operations. The cocoa sustainability program did lead the off-taking corporations purchasing more of their cocoa from certified Tier-1 suppliers. But the program failed to validate that Tier-1 suppliers purchased only from lower-tier suppliers that avoided use of child labor. As with reporting of GHG emissions across a multi-tier supply chain, reporting on compliance with generally expected societal norms may be productively enhanced through use of traceable and secure blockchain technology.

Beyond basic compliance with universal societal principles, many companies attempt to create societal benefits through philanthropy and employee voluntary participation in nonprofit organizations. Such "giving at the office" is helpful (to the extent that it does not distract from the corporation's core mission), and it deserves documentation and recognition in S-reporting. But metrics of dollars of contributions and employee hours in voluntary non-profit activities are measures of "S" inputs not "S" outcomes. To be meaningfully interpreted, philanthropic S reporting must connect to the corporation's theory of societal value creation.

Moving beyond compliance and philanthropy metrics, businesses have positive and negative *socio-economic* effects on their employees and those who live in communities where they operate. When a company downsizes due to competition, global sourcing, or automation, its former employees and others living in their communities can be harmed. Plant closures are highly-visible events, and the near-term impacts on former employees and their communities can be significant. A component of societal reporting could be the company's estimate of the magnitude and nature of the negative near-term socio-economic impact on employees and community from its closure decisions. But measuring the socio-economic impact from such closures is complicated. It depends on the economic situation in the

region, such as its current unemployment rate, the availability of alternative employment for the company's former employees, and of new customers for its former suppliers.

The adversity caused by competitive forces, moreover, is the normal dynamic of market-based capitalism. Innovative, rapid-growth companies, such as Apple, Walmart and Amazon, have succeeded by introducing highly-successful but disruptive business models that caused incumbent companies and their employees to be washed away in a Schumpeterian wave of creative destruction. Some advocates for S-reporting want to assign low grades to such disruptive companies because of their large negative impact on existing businesses, and the failing companies' employees, suppliers and communities. But such a grading policy reflects the preferences of those who benefit from a static (and ostensibly inefficient) status quo, and fails to reflect the preferences of the employees, suppliers, communities, customers, and, yes, investors of the innovating company. For instance, economists, studying the impact of Walmart's expansion during the 1985-2004 period, estimated that the company had reduced low-income consumers' cost of purchasing food and other retail products by 25%, a savings equivalent to all direct government aid to low-income families.[10] Disruption is a feature, not a bug, of capitalism. Requiring no, or even little, harm to the status quo – the customers, suppliers, employees, and communities of all existing companies – is a recipe for stagnation and, ultimately, a huge loss of potential income, wealth, and employment growth.

Throughout history, the growth in income and employment from introduction of new technologies and business models has greatly exceeded that of incumbent and now obsolete companies. Easing the transition from one form of employment to another, and supporting those who have become unemployed during the transition, is a task performed better by governments than corporations. The success of income support, education, and retraining programs should be accountability metrics for those governmental programs. Funds for the governmental programs should be made available from the higher taxes paid to local and national governments by the new and more profitable company, and its employees.

This dynamic does suggest that successful companies should refrain from lobbying for special tax breaks and exclusions that cause the adjustment programs to impose an additional funding burden on the local community. It also suggests that any such lobbying, together with corporate activities to funnel profits through offshore tax-havens, must be declared as corporate harms in S-reporting.[11] Curiously, companies in the Business Roundtable, ostensibly committed to redefining "corporate purpose," include some that pay the lowest U.S. corporate tax rates, and have higher rates of environmental and labor-related compliance violations, and receive more governmental subsidies than non-signatory peer firms.[12]

The converse of this situation also occurs. As companies expand and create opportunities for local employment and suppliers, they increase the region's socio-economic performance. For example, some companies now attempt to reach those who have remained untouched by corporate supply chains

[10] Jerry Hausman and Ephraim Leibtag, October 2005, "Consumer Benefits from Increased Competition in Shopping Outlets: Measuring the Effect of Wal-Mart." NBER WP 11809, December 2005.
[11] Karthik Ramanna, "Friedman at 50: Is It Still the Social Responsibility of Business to Increase Profits?," California Management Review, 2020 62(3):28-41.
[12] A. Raghunandan and S. Rajgopal, "Do Socially Responsible Firms Walk the Talk," Columbia Business School Working Paper (April 2021).

during the past 75 years of global economic expansion. As described in a recent paper[13], companies can create lower cost and more sustainable supply of goods, services, and talent while improving the socio-economic status of people living in impoverished regions and communities. The complex ecosystems required for these inclusive growth initiatives are not easy to develop and sustain; the companies that succeed could receive external acclaim and investment by measuring and reporting on the improved incomes, education, health, employment opportunities and family cohesion they help to create. The total "S" economic impact of a company's activities includes not only its own profits but also the economic activity and profits created all along its supply chain, including wages paid to those employed by its suppliers.

Another possible area for S-reporting is the nature of a company's core business itself. For instance, some companies such as tobacco cultivators, private-prison operators, weapons manufacturers, gambling operators, fossil-fuel extractors, and even certain pharmaceutical synthesizers face inherent ethical challenges to their existence. The degrees of these challenges vary across geographies and time, based on societal norms and on the size of the companies' perceived profitability. As institutional investors increasingly build equity portfolios of so-called ethical companies, all corporations will face the need to justify their core value-creation models in terms of prevailing and evolving societal norms.

Conclusion

Increased public pressure on corporations to disclose their environmental, societal, and governance performance has led to ESG reporting. But these reports have important components that are not founded on fundamental measurement and accounting principles, and that often default to measures of inputs and processes, not actual outcomes. Because of the urgent need for corporations and governments to become more pro-active, transparent, and accountable for their production of GHG emissions, we introduce a comprehensive framework for GHG accounting and reporting that can also serve as a basis for GHG taxes when the climate for such action becomes favorable. The implementation details for the framework still need to be tested and validated in practice, but all the measurement technologies for our proposed system for environmental accounting already exist.

Corporate reporting on societal outcomes is more complex because of diverse beliefs about the most beneficial or detrimental impacts of corporations on society. We suggest that societal reporting focus initially on areas where widespread agreement already exists about what constitutes good or harmful social outcomes, such as employee health and safety, eliminating use of child and slave labor in supply chains, and avoiding tax evasion. We also recommend that the governance component of ESG reporting be subsumed into financial, environmental, and societal reporting, since governance is a process and not an outcome in itself. In summary, rather than attempt to boil the ocean with ad hoc ESG metrics, we propose that a company's non-financial reporting begin with wide-spread adoption of specific metrics of environmental and societal performance. After learning how to report and audit well a few, highly relevant and controllable metrics, companies can innovate to expand disclosures of a broader set of environmental and societal impacts.

[13] Kaplan RS, Serafeim G, Tugendhat E, "Inclusive Growth: Profitable Strategies for Tackling Poverty and Inequality." Harvard Business Review 96, no. 1 (January–February 2018): 127–133.