

The Sustainability Delta: Considering Sustainability Opportunities in Firm Valuation

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ABSTRACT

In this paper we present the Sustainability Delta model as an improvement over existing environmental, social and governance (ESG) methodologies used in firm valuation. Starting from the question of how banks should integrate sustainability criteria into their valuation methods, we find that ESG methodologies currently do not consider the potential to generate higher future revenues due to sustainable innovations, and also lack consideration of different scenarios such as higher standards in legislation or consumer demand. To address these shortcomings the Sustainability Delta model is developed. Simulation results on the sugar manufacturing industry in Brazil demonstrate that by using the Sustainability Delta we estimate an improved firm value of 1.24%. The Sustainability Delta would allow for a more accurate valuation of firms as well as for the more effective allocation of capital for investors, which should bring market pressure to improve sustainability practices and thus contribute to sustainable development. Copyright © 2015 John Wiley & Sons, Ltd and ERP Environment

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Introduction

WE KNOW REMARKABLY LITTLE OF HOW INVESTORS INCORPORATE SUSTAINABILITY ISSUES INTO THEIR PORTFOLIO strategies. One growing approach is considering environmental, social and governance (ESG) risks in the valuation of companies in different industries (Cormier and Magnan, 2007; Lydenberg, 2013; Mengze and Wei, 2015; Park and Ravenel, 2013). Different cases such as BP's Deep Water Horizon (Kling *et al.*, 2012; Noussia, 2011) or conflict minerals (Low, 2012) demonstrate that investors face the risk of significant losses due to social and environmental mismanagement. However, most ESG criteria focus on currently known issues such as employee health and safety, pollution and adherence to governance standards, and thus inherently take a risk perspective (Lydenberg, 2013). Some companies, however, are beginning to take an opportunity perspective to ESG issues, e.g. Unilever (Bell, 2013; Simanis and Hart, 2009). Unilever's strategy is based on the assumption that addressing ESG issues proactively will have a positive effect on future cash flows, and thus firm

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value. In order to prepare for the future such companies use scenarios in order to detect latent ESG issues that might become more relevant over time.

Similarly, there is a growing discussion in the literature taking ESG issues as leverage for value creation. First, a new literature on shared value (Porter and Kramer, 2011; Prahalad and Hart, 2002; Spitzeck and Chapman, 2012; Spitzeck *et al.*, 2013) argues that business strategies should consider society as well as shareholders, as this enhances their long-term competitiveness. Second, there is a growing stream of literature around sustainable innovation, with the aim of creating new platforms of growth and future revenue for companies (Nidumolu *et al.*, 2009). Third, there is new evidence emerging that sustainable strategies lead to better financial performance in the long run (Eccles and Serafeim, 2013; Eccles *et al.*, 2013). Fourth, there is an increased awareness that financial markets have a particularly important role to play regarding sustainability issues (Richardson, 2009; Scholtens, 2006; Scholtens, 2009; Soana, 2011; Weber, 2014).

These discussions, however, have not reached the finance literature (with some notable exceptions mentioned above) and in particular research in the field of valuation. In order to contribute to the growing literature on sustainable finance we address the following research questions.

Does considering ESG scenarios and opportunities in valuation methods lead to a significant difference in firm value?

How should investors integrate future scenarios and ESG opportunities into valuation methods?

We explore the possibility that investors can improve portfolio allocation by evaluating firm valuation including sustainability opportunities (and risks). If so, increased market competition for information on firms' sustainability issues could lead to market pressure for improved performance.

The structure of the paper is as follows. The following section presents a discussion of the literature on the relation between ESG, sustainability and firm value in general. In the next section we focus on existing ESG methodology and firm valuation in particular. In the fourth section we develop the Sustainability Delta model and in the fifth present an application of the methodology for the case of a medium-sized sugar refinery in Brazil. The simulation shows that the Sustainability Delta is 1.24%, which means that in this case enterprise value increases by 1.24% from the base scenario once the firms moves to a sustainable business scenario. In the conclusion, we reiterate the main findings and outline avenues for future research.

What We Know (and Don't) about the Impact of Sustainability on Firm Value

Environmental sustainability in project and firm appraisals is increasingly important, having a long tradition in the sustainable development literature (Harou *et al.*, 1994; Vinten, 1994; White, 1996). In the early 2000s, researchers analyzed the relationship between financial and sustainability performance (Amato and Amato, 2012; Mănescu, 2011; Margolis and Walsh, 2003; Orlitzky and Schmidt, 2003; Paine, 2003; Vogel, 2005). Their main conclusion was that sustainability does not harm and, in the best-case scenarios, improves financial performance.

However, we know that mismanaging sustainability can lead to a loss of firm value, as high profile cases such as the BP oil spill (US\$30 billion of market value wiped out in a matter of weeks) demonstrate (Kling *et al.*, 2012; Noussia, 2011), and that most financial reports do not incorporate environmental information (Nilsson *et al.*, 2008).

Today, there is little doubt that some companies, especially large ones, are moving towards incorporating sustainability into their corporate strategy (Grayson *et al.*, 2014; Porter and Kramer, 2011). There is also emerging evidence that companies integrating sustainability into their strategies, governance structure and practices outperform their counterparts over the long term, in terms of both stock market and accounting performance (Eccles and Serafeim, 2013; Eccles *et al.*, 2013). We also know that there is a relationship between corporate social responsibility (CSR) practices and economic performance (Ameer and Othman, 2012; Callan and Thomas, 2009), and, more importantly, that corporate eco-efficiency (Guenster *et al.*, 2011) and sustainability practices (Lourenço *et al.*, 2014; Quisenberry, 2012) generate value.

We can see then that there should be a relation between a company's sustainability practices and firm value. Research presents a strong case for a risk perspective towards social and environmental issues, as mismanaging

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sustainability can be a cause for a decline in firm value. There is also an emerging case for an opportunity perspective, in the sense that addressing sustainability proactively can enhance firm value in the future.

Sustainable Firm Valuation Methodologies

The Relevance of Sustainability to Valuation

Sustainable firm valuation methodologies are concerned with the impact of sustainability issues on a firm's economic performance, not on its overall impact to society. A simple discount cash model demonstrates direct or indirect evidence that sustainability can impact a firm's value. Let us assume that a firm's value is the present value, based on its weighted average cost of capital, of its future cash flow.

Figure 1 guides us in the estimating a firm's value based on discount cash flows. The main idea is that the value of a company is equal to the present value of future cash flows, discounted by financing costs of the firm, represented by the weighted average cost of capital (WACC). Cash flows are determined by operating profits, as in net operating profits less adjusted taxes (NOPAT), less investments needs, the result of the variation in working capital and capital expenditures (Capex). We know that sustainability issues have a major impact on operating income, both positive, in terms of turnover, and negative, in terms of increased operating costs, although best practices can result in improved environmental performance and reduced costs (Chegut *et al.*, 2011; Christmann, 2000; Quisenberry, 2012). We also know that investments in sustainable practices are larger in the short run, increasing capital expenditures by greener companies (Jarvis and Sovacool, 2011; Laurence, 2011; Wagner, 2010). The result is that we have a dynamic relationship between operating performance and capital expenditures in the long run – smart investments will generate improved performance, even though there are periods of smaller cash flows related to increased investments.

Finally, there is mixed but compelling evidence that more sustainable companies can reduce the cost of capital of non-financial firms. Goss and Roberts (2011) show that the modest premiums associated with CSR suggest that banks do not regard CSR as either significantly value enhancing or risk reducing. Correspondingly, banks' own CSR performance is relatively low (Weber *et al.*, 2014). However, Nandy and Lodh (2012) find that eco-friendly firms obtain more favorable loan contracts than less sustainable firms, and there is also evidence that banks value CSR practices (Dhaliwal *et al.*, 2011; El Ghoul *et al.*, 2011), even though the effect is not the same for all kinds of firm – high quality borrowers can get loans with lower costs regardless of their sustainability performance. Similar results have been observed in the insurance industry (Phelan *et al.*, 2011; Scholtens, 2011). There are two trends regarding the relationship between sustainability and cost of capital – banks should value strategic sustainability over pure CSR policies (Zeidan *et al.*, 2014), and as markets mature there should be a stronger relationship between those characteristics.

The overall evidence is that sustainability issues can impact a firm's valuation by changes in future operating income and the cost of capital. The main challenge is bringing materiality to these issues so one can measure the change in valuation related to sustainability in business practices (Eccles *et al.*, 2012) and shared value (Porter and Kramer, 2011).

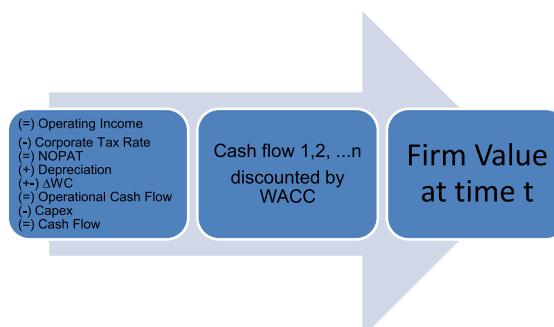


Figure 1. A simple cash flow method for firm valuation.

The main concern in relating sustainability issues to valuation methods is that neither one is well defined. The impact, in terms of risks and opportunities, of sustainability issues on the value of a firm is a multi-dimensional issue, and therefore there is more than one kind of valuation method. An ideal model that would incorporate sustainability into valuation models should have the following desired characteristics:

- to be able to bring materiality to sustainability issues;
- to be relatable to issues in the chosen valuation method;
- to be amenable to the creation of different simulation scenarios.

The first issue is one of the main hurdles in incorporating sustainability issues into financial modeling. First, sustainability reporting standards need to improve sector-specific materiality (Eccles *et al.*, 2012), because the usual way of reporting does not readily allow the creation of financial information based on the self-reported sustainability initiatives (Reverte, 2012). Many firms already use AA1000 certification or develop a materiality matrix, but have difficulties explaining how relevant materiality issues impact on financial performance. In a recent Accenture CEO survey, only 38% of interviewed CEOs 'believe they can accurately quantify the value of their sustainability initiatives' (Accenture, 2013, p. 15).

Given this background, we need a working model of how investors determine the value of a firm. There are three main categories of valuation techniques (Damodaran, 2012): comparable analysis (such as multiples, precedent analysis, SOTP), liquidation models (asset-based, and fair-based values) and discount cash flow methods. The first requires information on company peers and adjust value for company-specific information.

Liquidation models assume the company is going to be liquidated and therefore management decisions and outside expectations do not impact the future of the company.

Discounted cash flow methods look at future cash flows, assuming a company is only as valuable as its capacity to generate value to shareholders in the future. It is the most common valuation method and the one we argue that is best suited to incorporate sustainability issues.

In practice, there is evidence that some measure of valuation models already incorporate ESG (environmental, social and corporate governance factors) in discounted cash flow methods based on data from the GRI (Global Reporting Initiative) reports generated by listed companies (Kocmanova and Simberova, 2012). The GRI is an important measure of compliance with social and environmental regulation and standards by large public companies. For instance, the MSCI Sustainability Indexes include companies with high ESG ratings relative to their sector peers – the methodology is based on the highest ESG-rated companies making up 50% of the adjusted market capitalization in each sector of the underlying index, subject to the limitation that only companies with an ESG rating of 'B' or above are eligible for inclusion. Kiernan (2007) argues that ESG is particularly important for ultimate owners who want to create long term value for their companies.

Another advantage of the ESG methodology is that, if done well, it includes an internal view and values strategic decisions by the management team. This differentiation is important, because as Székely and Knirsch (2005) argue, most sustainable development initiatives have been developed in response to outside pressure and in isolation from business activity and are therefore not yet directly linked to business strategy. The same point has been made by Milne and Gray (2013), who argue that GRI reporting is an insufficient condition for organizations contributing to sustainability. They also argue that, paradoxically, such focus may reinforce business as usual (BAU) and greater levels of un-sustainability, as reporting indicators are not used to alter management decisions. If companies and banks only focus on improved reporting, without using such standards on decision-making, it may indeed reinforce BAU behavior. We take a different view, but concede that merely focusing on publicly available data, sometimes generated for compliance only purposes, may present problems in addressing relevant impacts to a firm's future cash flow based on sustainability issues.

Therefore, we argue, with a caveat, that the ESG is a good way to bring materiality to sustainability issues, because it measures how companies are affected by, and responsive to, sustainability issues based on the GRI questionnaire. Some researchers see it as far from perfect (Eccles *et al.*, 2012), but it is the best standard that is readily and publicly available, and Hanson (2013) shows that the world's best 'business value investors' have long incorporated ESG considerations into their investment decision-making.

Summarizing the findings in the literature we recognize two major limitations of the ESG methodology: (1) it is focused mainly on risks and does not consider opportunities, and (2) it does not consider future scenarios.

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ESG Valuation – Predominantly a Risk-Calculation

Itaú Asset Management (2013) provides one interesting example of using ESG for firm valuation. The bank uses the ESG methodology to change the valuation of construction companies in Brazil in 2013. They measure the sustainability risks of the operations of six listed companies and potential impacts in their future cash flows. Four of the six companies present measurable sustainability risks, and the change in valuation of these companies ranges from US \$2.7 million to US\$421 million. Table 1 shows the companies, their market value, as measured by regular DCF methods, and the sustainability risks, as measured by the ESG methodology.

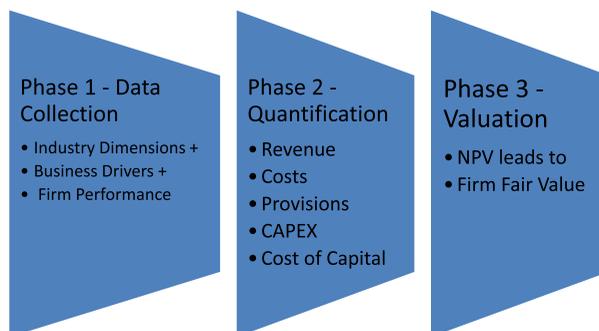
We can see from Table 1 that the ESG impact on market capitalization is small (less than 1%) for all companies but one: MRV. For this company the sustainability impact reaches over US\$400 million, and 17% of market value. This prediction was found to be reasonably accurate when MRV was found using slave labor in 2013 and accordingly was fined and excluded from government contracts for a while. This is evidence that incorporating sustainability risks can have a significant impact on firm value. The ESG methodology used by Itaú Asset Management is based on the characteristics shown in Figure 2.

In Phase 1 data is collected on the industry and its specific financial, social and environmental issues (e.g. relationship with communities in the mining industry, product toxicity in toys, or child labor in the apparel industry). Also, firm performance of players in the industry is observed. In Phase 2 impacts of social and environmental management on financial variables (revenue, costs, Capex etc.) are quantified in order to determine in Phase 3 how far discounts need to be applied to specific firms.

The method used by Itaú follows a typical valuation methodology, but incorporating ESG factors. Likewise, Herzel *et al.* (2012) use sustainability as a constraint in optimal portfolio decisions. In the Sustainability Delta model, we aim to complement the ESG methodology with the possibility of positive cash flows. The idea is that more sustainable companies should generate a market premium, and not only a zero discount in their market valuation.

	Cyrela	MRV	Brookfield	Rossi	Gafisa	PDG
Market cap	3 025 305	2 426 312	5 007 000	697 214	777 288	1 953 969
ESG discount	-4152	-421 700	-2774	—	-7046	—
ESG/M Cap (%)	-0.1	-17.4	-0.1	0.0	-0.9	0.0

Table 1. ESG methodology for valuation – companies, ESG discount and percentage of market value – in thousands of US\$. Source: Itaú Asset Management, 2013.



Source: Itaú Asset Management, 2013.

Figure 2. ESG method for firm valuation.

ESG Valuation – and If the Scenario Changes?

Environmental, social and governance issues usually represent currently known sustainability risks. In the same way, benchmarking exercises might help companies to identify current best practices and apply them to their own operations.

However, the relevance of some issues might increase or decrease in the future. Take the availability of water as an example. Some regions will be more affected by droughts in the future and water-intensive businesses might become economically unviable. Additionally, new issues regarding innovation or climate change risks might emerge in the future, which are not relevant for a firm’s cash flow at present. Therefore, researchers are starting to use scenario planning to predict future ESG impacts (Bügl *et al.*, 2012; Gössling and Scott, 2012; Parkinson *et al.*, 2012), mostly from an industry perspective as suggested by Eccles *et al.* (2012).

If scenario planning techniques help model the future of industries they might also increase the accuracy of valuation as a better fit between sustainability risks and opportunities – the relationship between firm strategy and future cash flows should be particularly sensitive to sustainability risks and opportunities. Looking at how sustainability issues evolve over time is then paramount to adjust regular discount cash flow methods of firm valuation.

The Sustainability Delta – Integrating Opportunities and Scenarios

The discussion on existing ESG methodology has shown that current approaches to sustainable firm valuation do not consider positive future cash flows or future scenarios. We present the Sustainability Delta as well as a simulation to demonstrate its impact on firm value.

The Sustainability Delta presented in Figure 3 considers a variant of ESG opportunities, which have the potential to increase present firm value at t_1 . Additionally, considering scenarios might improve the accuracy of the valuation if management decisions help to reduce future risks and increase the chances to exploit opportunities (upper Sustainability Delta at t_2). If, to the contrary, management does not integrate sustainability issues into its strategic considerations, we might find firm value compromised by higher risks and lower chances to exploit opportunities in the future (lower Sustainability Delta at t_2).

The main issue for the ESG methodology or the present Sustainability Delta is one of materiality – relating sustainability issues to future cash flows. The ESG methodology tries to solve this by ranking the possible impact

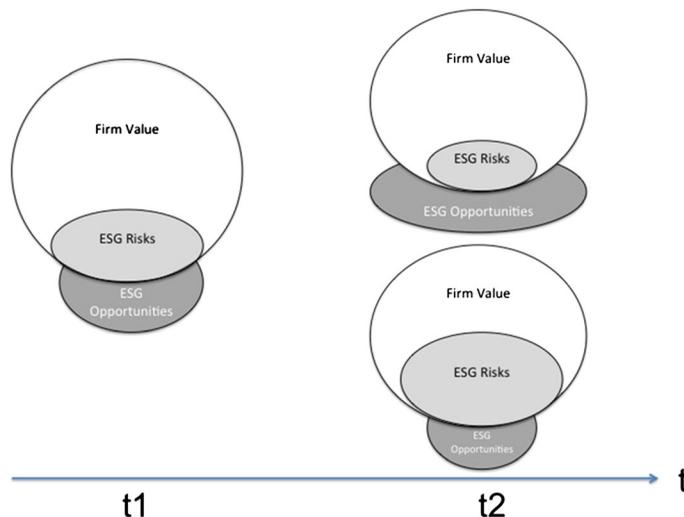


Figure 3. The Sustainability Delta over time.

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of ESG factors on firm value. Our present methodology is complementary to the ESG approach – it requires the creation of primary data for it to be successful, and ranks the relevant factors to impact future cash flow. The data requirements are specific to companies and industries and relate to variables in a cash flow statement. For instance, prices can be affected by price premiums based on sustainable goods and services, and the quality of such goods can affect the quantity of goods and services sold. The result is that long-term revenue is affected by investments in more sustainable goods and services. This is the main strategy behind the new sustainability push by companies such as Unilever. Other variables are affected by sustainability issues in different ways. The cost of capital is based on reputation and the eco-premium perceived by financial institutions, while capital expenditures may be higher in the short run and lower in the long run for companies that are first entrants in promoting sustainable means of production.

We assume the following to develop the Sustainability Delta:

- weak form of the efficient market hypothesis;
- risk neutrality;
- homogeneous beliefs (Ohlson, 1995).

We want to arrive at a measurable outcome that is independent of investors' preferences for sustainability. By having homogeneous preferences and risk neutrality, we can try to objectively measure the impact of sustainability on a firm's cash flow. The weak form of the efficient market hypothesis is necessary to guarantee that market valuations do not incorporate all information into a firm's future cash flow.

The methodology of the Sustainability Delta goes from general principles to firm-level analysis, as in Figure 4.

The first stage establishes the variables that are relevant to a specific firm, going from general variables regarding six sustainability dimensions to the specific ones that impact a firm's future cash flow. The qualitative analysis is composed of a life-cycle analysis of the products, identifying the main social and environmental impacts as well as their financial impact. Additionally, six sustainability dimensions are evaluated: economic growth (EG), environmental protection (EP), social progress (SP), socio-economic development (SD), eco-efficiency (EE) and socio-environmental development (SD). Equipped with this data the most relevant value drivers can be identified. In a second step the impacts of the value drivers on future cash flows are evaluated, including revenue and costs. In the final valuation stage the sustainability delta is calculated in terms of ROIC (return on invested capital) and WACC, considering different possible scenarios, with associated probabilities to allow us to simulate different valuation results.

It distances itself from the ESG methodology because it has the same focus on opportunities as it has on risks. Hence, it analyzes the probability of increased revenue by new products or services, decreasing costs by targeted sustainable practices, and increased social capital by renegotiation of the social contract between the company and its stakeholders. Building sustainable goodwill can increase revenue and decrease costs, from litigation and provisions to improved market share (Lourenço *et al.*, 2014).

Another difference is the focus on the time dimension. We analyze the evolving role of sustainability on cash flows through different sustainability paths. Impacts on cash flows depend on investments and decisions towards more sustainable means of productions and final goods and services. We analyze such a path through three phases: business as usual (BAU), sustainable business (SB) and future sustainable business (FSB), as in the work of Zeidan *et al.* (2014).

We argue that classifying companies among their peers in such a way allows us to create a model that would enable a researcher to value future cash flows.

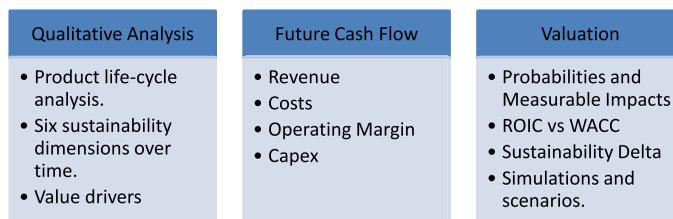


Figure 4. The process of the Sustainability Delta.

Since we are dealing with cash flows, it is paramount to understand the path of a company regarding sustainability issues. Take long-term costs, for instance. Assuming a company is investing in innovation and sustainable means of production, costs should be lower in the long run, and thus operating income should be higher. If companies already comply with best practices, their costs should not rise in the near future, impacting the cash flow, as in figure 4. Significant fines for labor practices and environmental issues that could be prevented happen constantly and show how some companies are far away from embodying the best practices of many industries. Our analysis is based on a sustainability path as in Figure 5. We try to determine the sustainability factors related to costs, revenues and other variables as they evolve over time.

Discount cash flow methods rely on operating income as the main variable to be discounted to the present, and a decrease in costs leads to higher valuation. The main issue is how to measure such cost savings on future cash flows. Here we are explicitly concerned with the sustainability impacts on firms' future cash flows by establishing a probability that the variables related to a firm's valuation are related to sustainability events. Given a selected industry, the process involves the following.

- Value drivers: product life-cycle analysis, value chain, legislation and public policy, industry self-regulation, and innovation.
- Defining variables related to individual firms, in each of six sustainability dimensions: economic growth (EG), environmental protection (EP), social progress (SP), socio-economic development (SD), eco-efficiency (EE) and socio-environmental development (SD).
- Developing paths for the average firm: business as usual (BAU), sustainable business (SB) and future sustainable business (FSB).
- Determining the relationship between the selected variables over time and the components of firms' valuation.
- Combining the information on the steps above to obtain the percent of coverage on each variable and measurable impacts on cash flow and WACC.
- Calculating the Sustainability Delta.
- Establishing scenarios for simulations of the results.

The Sustainability Delta is supposed to combine qualitative and quantitative methodologies. In this respect it relates well to regular discount cash flow methods, which rely on qualitative assumptions about the behavior of future cash flows. If used well it should fit nicely in the line of arguments developed by Eccles *et al.* (2012) and Cerin and Scholtens (2011) regarding the ability to bring materiality to sustainability issues. The end result is a matrix of coverage and impact that affects the valuation of a company, as represented in Table 2, which shows a typical simplified cash flow statement used in valuation methods.

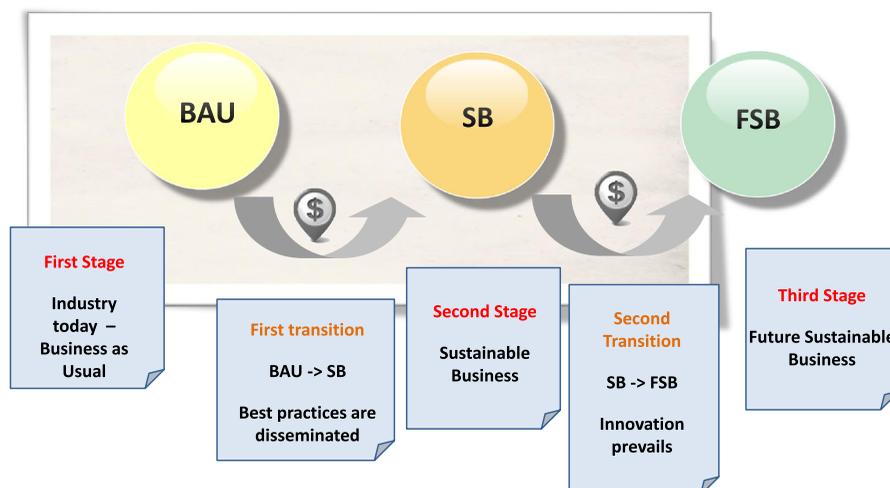


Figure 5. From business as usual to a future sustainable business.

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	BAU		SB		FSB	
	% Coverage	Measurable Impact	% Coverage	Measurable Impact	% Coverage	Measurable Impact
Addressable market						
Market-share						
Revenue						
(-) Variable costs						
(-) Fixed costs						
(=) EBITDA						
(-) Depreciation and amortization						
(=) EBIT						
(-) Corporate income tax						
(=) NOPLAT						
(+) Depreciation and Amortization						
(+/-) Working capital						
(=) Operational cash flow						
(-) Capex						
(+) Terminal value						
(=) Enterprise cash flow						
Discounted by WACC						
(=) Enterprise value						

Table 2. Cash flow and the Sustainability Delta.

Take for instance addressable market share. The first question one should ask is whether sustainability plays a role in addressable markets. For companies such as the cosmetic companies The Body Shop or Natura, sustainability is related to all its addressable market, hence the coverage of the addressable market affected by sustainability issues would be 100%. In another case, take a construction company in a poor country. For such a company most of the addressable market is related to local infrastructure projects, which are hardly affected by sustainability opportunities, given that there is no demand for sustainability-specific projects in government purchases in most poor countries. Moreover, there is no eco-premium in this market – local governments, for instance, are not willing to pay higher prices for projects that take sustainability into account. Companies may be forced to change their projects to comply with environmental law, but their customers are not, in general, willing to purchase projects at higher prices given its sustainability characteristics. This may change in the future, and the probability that the addressable construction market is affected by sustainability issues is close to 0% in the BAU scenario, but increases in the path to SB and FSB practices.

In contrast, if we analyze another industry that has been the target of sustainable finance initiatives, the sugar industry in Brazil, we can establish positive probabilities to the addressable market in relation to the path from BAU to FSB. Sustainable farmed sugar has a very small penetration in the world market in 2013, less than 1%, but its relevance is expected to increase over time (Potts *et al.*, 2014). It also commands an eco-premium, with prices, as of 2013, 20% above that of regular refined sugar. Companies rated higher in terms of sustainable production could improve their margins and sales, hence commanding higher valuation. The same change in valuation is due to the production process and cost management. Take water challenge, one of the most important issues in agriculture as we move towards a future sustainable business. It is not an issue for every firm (it affects farmers more than manufacturers), but it can become a major issue in some areas in Brazil. Depending on the area its probability of impact on costs range from 5% to 20% of variable costs. Companies that are rated higher in the path from BAU to FSB in relation to water management increase their valuation by lowering future variable costs. However, companies that want to pursue sustainability strategies have, at first, to increase their capital expenditures, which

can reduce their value. Addressing a comprehensive Sustainability Delta involves then assumptions about the necessary investments and future cash flows generated by sustainability strategies.

We argue that the main advantage of the Sustainability Delta methodology is that it provides a seamless integration with regular discount cash flow methods. We need assumptions, qualitative information and measurable impacts to determine changes in the variables that comprise a firm's future cash flow.

Sustainability Delta: an Application

We present the SD impact on the valuation of a sugar manufacturer. This case is based on real data (with some approximations for simplicity) from a small sugar manufacturer in the Midwest in Brazil. Its valuation is based on the following assumptions:

The company produces white sugar in Brazil. It has seven year contracts with farmers that supply sugar cane in close vicinity. It is located in a frontier region in which the industry is expanding, with productivity that is lower than in the main producing regions in the country, but growing at 1% a year.

The initial valuation period is 5 years, from 2015 to 2019. We assume that the values of 2019 are going to be constant from then on, arriving at a terminal value equal to the present value of a perpetuity based on (NOPAT less working capital and Capex) discounted by the WACC of the company.

Today the firm produces 400 000 pounds of sugar a year, and is expanding towards 700 000 tons in 5 years. Its production is growing by roughly 15% a year. Sugar prices are estimated to be US\$15 a pound in 2015 and should be constant at US\$16 a ton for the rest of the period.

Variable costs are US\$10 per pound in 2015 and grow by 3% a year during the 2015–2019 period (accounted for the growth in productivity). Fixed costs are US\$800 000 in 2015 and grow at 10% a year. All values are inclusive of taxes. Capital expenditures are US\$500 000 in 2015 and grow by 10% a year from 2015 to 2019. Investments in working capital are US\$100 000 in 2015, and given a constant financial cycle of 40 days its values are, respectively, US\$151 111 in 2016, US\$122 667 in 2017, US\$141 067 in 2018 and US\$162 227 in 2019.

We assume that from then on there is no change in operating profit. The firm does not need to spend on new investments, but its operating margin decreases by the same value as the Capex, for simplicity.

	2015	2016	2017	2018	2019
(=) Revenue	6 000 000	7,360 000	8,464 000	9 733 600	11 193 640
(–) Variable costs	–4 000 000	–4 738 000	–5 612 161	–6 647 605	–7 874 088
(=) Operating margin	2 000 000	2 622 000	2 851 839	3 085 995	3 319 552
Operating margin (%)	33	36	34	32	30
(–) Fixed costs	–800 000	–864 000	–933 120	–1 007 770	–1 088 391
(=) EBITDA	1 200 000	1 758 000	1 918 719	2 078 226	2 231 161
(–) Depreciation and amortization	–200 000	–220 000	–242 000	–266 200	–292 820
(=) EBIT	1 000 000	1 538 000	1 676 719	1 812 026	1 938 341
(–) Income taxes (34%)	–340 000	–522 920	–570 084	–616 089	–659 036
(=) NOPLAT	660 000	1 015 080	1 106 635	1 195 937	1 279 305
(+) Depreciation	200 000	220 000	242 000	266 200	292 820
(+–) Working capital	–100 000	–151 111	–122 667	–141 067	–162 227
(=) Operational cash flow	760 000	1 083 969	1 225 968	1 321 070	1 409 898
(–) Capex	–500 000	–550 000	–605 000	–665 500	–732 050
(+) Terminal value					12 483 461
(=) Enterprise cash flow	260 000	533 969	620 968	655 570	13 161 310
		Enterprise value		9 662 930	

Table 3. Base scenario (business as usual) of a firm valuation. US\$.

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Capital structure is composed of 40% of debt and 60% of equity, and assumed constant for the whole period. Cost of capital is also assumed constant, 7% a year for debt (due to subsidized credit) and 14% a year for equity. Cost of capital is also assumed constant over the whole period. Given all these assumptions, the final cash flow is found in Table 3.

We arrive at an enterprise value of around US\$9.6 million with the BAU scenario.

We apply the Sustainability Delta by focusing on two cases, for simplicity: impact on cost management and an eco-premium on organic sugar. After looking at qualitative data, specifically the questionnaire based on the work of Zeidan *et al.* (2014), we classify the company in the BAU category based on energy management and product development. We do not, at this point, analyze the company in terms of sustainability risks. By looking at its classification from the questionnaire, the company clearly faces some sustainability risks that would bring its valuation down if we followed solely the ESG methodology. We base our analysis on the SB path, in which the best practices for these two issues follow the example of companies that already use these practices.

The result of the analysis of the opportunities regarding energy management in the area, with data from the industry and a typical SB firm, shows that best practices on energy management rely on bioenergy production from sugarcane bagasse, a by-product of the production process. We estimate that the coverage rate is only 2% of total fixed costs, a very conservative estimate. The measurable impact follows the typical cash flow profile of an investment in bioenergy production for a small sugar producer.

- Capex of US\$200 000 in the first year and US\$100 000 in Years 2 and 3.
- Energy savings (the firm is not large enough to sell excess energy until Year 5, but this would require more investments in connecting the company to the grid, which we disregard at this point) of US\$15 000 beginning in Year 2.
- Subsidized credit for the investment, reducing the firm's total cost of capital by 0.2% a year (we assume 70% debt financing with subsidized loans by innovation programs from the Brazilian government –this is a generous assumption, as bioenergy projects can find 100% debt financing at very low costs by some Brazilian agencies such as Finep, BNDES and others).

As for organic sugar, the SB firm production ranges from 5 to 20% of the total sugar production for the local market or exports. Our firm could, with its current infrastructure, easily produce up to 5000 tons of organic sugar a year with minimal investments, a coverage rate of less than 1.5%. It could choose a larger production, but that

	2015	2016	2017	2018	2019
(=) Revenue	6 000 000	7 376 000	8 482 400	9 754 760	11 217 974
(-) Variable costs	-4 000 000	-4 738 000	-5 612 161	-6 647 605	-7 874 088
(=) Operating margin	2 000 000	2 638 000	2 870 239	3 107 155	3 343 886
Operating margin (%)	33	36	34	32	30
(-) Fixed costs	-800 000	-849 000	-918 120	-992 770	-1 073 391
(=) EBITDA	1 200 000	1 789 000	1 952 119	2 114 386	2 270 495
(-) Depreciation and amortization	-200 000	-220 000	-242 000	-266 200	-292 820
(=) EBIT	1 000 000	1 569 000	1 710 119	1 848 186	1 977 675
(-) Income taxes (34%)	-340 000	-533,460	-581 440	-628 383	-672 410
(=) NOPLAT	660 000	1 035 540	1 128 679	1 219 803	1 305 266
(+) Depreciation	200 000	220 000	242 000	266 200	292 820
(+/-) Working capital	-100 000	-152 889	-122 933	-141 373	-162 579
(=) Operational cash flow	760 000	1 102 651	1 247 745	1 344 629	1 435 506
(-) Capex	-700 000	-650 000	-705 000	-665 500	-732 050
(+) Terminal value					12 990 302
(=) Enterprise cash flow	60 000	452 651	542 745	679 129	13 693 758
			Enterprise value	9 782 791	

Table 4. Sustainable Business scenario and firm valuation. US\$.

would involve distribution, marketing and investment risks. Assuming no costs for introducing the product or additional marketing, a strong but realistic assumption given the distribution channels already in place, we assume the following measurable impacts.

- Prices 20% higher than regular sugar.
- Sales in the local market, diversifying revenue streams (the company is mainly an exporter). Effect is not shown as cash flow.
- Production begins in Year 2 and grows at the same rate as total production (which stays the same over the period).

Results are in Table 4. The Sustainability Delta is 1.24%, which means that in this case firm value (actually enterprise value, as we do not consider the amount of debt, cash holdings and the value of the land) increases by 1.24% from the base scenario if the firm moves from BAU to the SB path regarding bioenergy and a small amount of organic sugar production. We should note that, given the impact of terminal value on the valuation of the firm, analyzing the FSB path is actually quite relevant to the present valuation of a firm. Companies that are moving towards more sustainable means of production and looking to sell more sustainable goods and services should become significantly more valuable as markets develop to incorporate it in their cash flows.

Conclusion

This paper aimed to answer the question whether considering ESG scenarios and opportunities in valuation methods leads to a significant difference in firm value. The Sustainability Delta is presented as a new methodology and used in a simulation to a small sugar manufacturer with some simple assumptions about its cash flow profile. The result is a change of 1.24% in enterprise value. This simulation, in addition to insights from the literature review, suggests that the integration of ESG scenarios and opportunities can lead to significant alterations in firm value.

Theory on sustainable finance demonstrates that current ESG methodologies lack a consideration of opportunity exploration to enhance future cash flows as well as a scenario building exercise. To contribute to theory, we therefore propose the Sustainability Delta as an alternative valuation methodology. We provide evidence of materiality to sustainability issues (Eccles *et al.*, 2012) and show that sustainability reporting can generate useful information for market agents, to mitigate the critique by Milne and Gray (2013).

There are three main limitations to the Sustainability Delta methodology:

- information requirements;
- the fact that it works better with single product companies;
- difficulty of assumptions regarding SB and FSB paths and its impacts on future cash flows.

Any valuation method suffers from the first two issues, but they are more relevant when trying to incorporate sustainability into future cash flows. It is particularly difficult to estimate the needs for present day investments and future savings and improved cash flows from sustainability issues. Ratings and indexes (Singh *et al.*, 2007; Zeidan *et al.*, 2014) are a major step forward, but full cash flow estimations based on sustainability issues are still in their infancy.

The third requirement is related to qualitative information on the future of the industry and the place of the typical firm as a future sustainable business.

Future research could analyze in more detail how sustainability innovations enhance future cash flows by either improving revenues, lowering operating costs or reducing costs of capital. In particular, it would be interesting to implement the Sustainability Delta in a given portfolio and compare firm values with current standard valuations over time. Ideally, financial modelling would show increased return for selected portfolios based on capital asset pricing models that incorporate sustainability issues. These potential results should encourage the diffusion of methodologies akin to the present Sustainability Delta.

Our research points to practical implications for several audiences. First, investors might be interested in testing the Sustainability Delta methodology to allocate capital more efficiently, even in a scenario in which lack of

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standards, regulations and uniform accounting schemes still poses a challenge to contemporary sustainability finance and accounting (Ngwakwe, 2012). Second, environmental managers are encouraged to collaborate with their colleagues from the financial departments to generate data on how activities such as life-cycle analysis, future scenarios and the implementation of benchmarks impact future cash flows. Third, policy makers might want to encourage companies to share more information about their sustainability investments and increase the accuracy of sustainability reporting.

By presenting the Sustainability Delta we hope to encourage firms to invest in sustainability technologies and innovations that prepare them for future market requirements as well as for investors who will profit from future cash flows. If we can prove that investments into sustainability prepare firms for higher returns, lower risks and longevity in the future, we can expect that businesses engage more seriously in sustainable development. Especially if investors use their capital allocation to favor more sustainable management practices the consolidated impact on sustainable development can be substantial.

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