



Santiago Galeano, Ulrich Hemel und Katharina Schüller

**Quality Education, UN Sustainable Development Goals &  
the financial sector**

**The traditional financial sector, FinTechs and their contribution to  
the attainment of the UN-SDG Nr. 4**

**Institut für Sozialstrategie**

Laichingen – Jena – Berlin

Bleichwiese 3, 89150 Laichingen  
[www.institut-fuer-sozialstrategie.de](http://www.institut-fuer-sozialstrategie.de)  
[kontakt@institut-fuer-sozialstrategie.org](mailto:kontakt@institut-fuer-sozialstrategie.org)

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### **Abstract [en]:**

Framed by the context of globalization and digitization, quality education has to entail digital and financial literacy as key components purporting statistical thinking. Quoting H.G. Wells: *“the ability to deal with risk and uncertainty will be as necessary for efficient citizenship in a modern technological world as the ability to read and write.”*<sup>[a]</sup> It is because of that, that we consider fundamental to include financial literacy as a constitutive component of the United Nations Sustainable Development Goal Nr. 4: Quality Education.

Nowadays, data are being generated from the most varied sources. Drowning in information is a risk inherent to the nature of a digitized world where Big Data plays a fundamental role. The latter poses a challenge for the professional investor, and most concerning, establishes a barrier for the relatively uninformed citizen. If public, private and civil society actors fail to recognize the importance of financial literacy as a constitutive part of quality education, we risk giving steps back to the attainment of the Goals and deepen the structural nature of global poverty and inequality.

### **Abstract [de]:**

Vor dem Hintergrund der Globalisierung und Digitalisierung muss hochwertige Bildung digitale und wirtschaftliche Kompetenz als Schlüsselkomponenten für statistisches Denken beinhalten, so wie es das Zitat H.G. Wells ausdrückt: *„the ability to deal with risk and uncertainty will be as necessary for efficient citizenship in a modern technological world as the ability to read and write.”*<sup>[b]</sup> Aus diesem Grund betrachten wir wirtschaftliche Bildung als grundlegend konstitutive Komponente des vierten Ziels der UN-Entwicklungsziele: Hochwertige Bildung.

Heutzutage werden Daten aus den verschiedensten Quellen generiert. Das Ertrinken in Informationen ist ein Risiko, das der Natur einer digitalisierten Welt innewohnt, in der Big Data eine fundamentale Rolle spielt. Letzteres stellt eine Herausforderung für den professionellen Anleger dar und schafft vor allem eine Barriere für den relativ uninformierten Bürger. Wenn öffentliche, private und zivilgesellschaftliche Akteure die Bedeutung von Finanz- und Wirtschaftskompetenz als konstitutivem Bestandteil von Hochwertiger Bildung nicht erkennen, verpassen wir sinnvolle Schritte zur Erreichung der UN-Ziele und tragen zur Vertiefung des strukturellen Charakters globaler Armut und Ungleichheit bei.

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[a] This quote is a shortening out of (Wells, 1911).

[b] Ibid.



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# 1 Introduction

The United Nation Sustainable Development Goals (UN-SDGs) were born during the 2012 United Nations Conference on Sustainable Development that took place in the Brazilian city of Rio de Janeiro. The Sustainable Development Goals (SDGs) formally replaced the Millennium Development Goals that, in the year 2000, started an unprecedented effort to globally tackle poverty and inequality. The underlying characteristics of the SDGs encompass a universal and agreed-upon nature, its measurability and the establishment of certain key targets prioritizing the efforts towards the development and attainment of the Goals. It is central to the nature of the Goals to bring together and call upon the active participation and involvement of public, private and civil society actors. It is widely accepted that without the active participation of one of the aforementioned actors, the targets would be impossible to reach.

Among 17 different goals ranging from environmental protection to gender equality and the promotion of economic growth, there is one that stands out because it is the foundation to “improving people’s lives and [allow for] sustainable development”.<sup>1</sup> The 4th UN-SDG (in our opinion, the cornerstone of all the others), is to “*ensure inclusive and quality education for all*” while promoting lifelong learning. The 10 different targets of the goal include, among others, equitable and quality education at all levels, the achievement of literacy and numeracy for all youth and a substantial proportion of adults, as well as the configuration of inclusive education environments for vulnerable populations. The horizon set for the achievement of the targets is the year 2030, with the exception of the target aimed at increasing the number of scholarships available to developing countries (2020). A clear absent from the targets is an equal - and most importantly, an informed and literate access to financial institutions and services: we assert that this is the key to reduce structural inequality and poverty, essential and fundamental for the attainment of the Goals.

As stated in the subsection “Quality Education” in the webpage of the UN-SDGs, “*when people are able to get quality education they can break from the cycle of poverty*”. The latter is true only if they are given equal opportunities, and this naturally includes, as stated before, the access to financial institutions and services. The access should be informed and literate, and that requires financial and digital literacy in order to effectively perform in highly interconnected, global financial markets. Digital and financial literacy can be seen as components of statistical thinking. It is true that the SDGs are already ambitious and have proved to be tremendously challenging as they are formulated right now. Nevertheless, we doubt the goals would be attained without explicitly including financial literacy as a fundamental constitutive element of quality education

“*We are drowning in information but starved for knowledge*” (Naisbitt, 1982). The access to vast amounts of information, thanks to the nowadays-characteristic ubiquitous stream of data generated by all kinds of sources does not guarantee an efficient citizenship in a modern, digitized world. The exponential growth of data and its proportionally inverse relationship with the costs of collecting and interpreting it represent a huge opportunity for the global civil society composed by individuals and non-governmental organizations. Businesses play a central role in this dynamic of digitization.

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<sup>1</sup> As recognized by the UN in the official webpage of the Goals. (Organization of the United Nations, n.d.)

Recently, businesses have been “*encouraged to take a proactive role in international development*” (Scheyvens et al., 2016), and this is a specific call of the UN-SDGs. Nevertheless, there is a generalized distrust stemming from public and civil society actors and an overall reluctance to hold business accountable for development outcomes (Blowfield, 2012). Suspicion of businesses is generalized thanks to the widespread myth that it is not easy to embed the SDGs to the profit-maximizing desire of companies. Recent literature has empirically shown that corporate social responsibility is tightly linked to a better financial performance of businesses (Carroll Archie B. & Shabana Kareem M., 2010; McGuire, Sundgren, & Schneeweis, 1988). This could explain why businesses are more eager nowadays to play an active role in the development of broader sustainability attempts. Corporate social responsibility does not compromise the financial performance of companies, but on the contrary, increases the profits and serves an image-enhancing purpose linked to public relations and good marketing practices.

The latter is especially useful since “*governments and their international arms... have failed in their attempts to rid the planet of under-development, widespread inequalities and poverty*” (Hopkins, 2007). The participation of private actors in the dynamics of sustainable development is a win-win scenario, and a necessity when regarding the nature of all the SDGs: Governments alone cannot attain them. This essay focuses on different attempts of the financial sector to contribute to the Goals and enhance quality education through financial literacy. Financial and digital literacy need to be evaluated with respect to their contribution to social cohesion and overall welfare, i.e. to learning and education, participation, and to individual and community development.

It is very unlikely that everyone will profit equally from technological developments: inequality is thus a consequence of this. A recently published study by the German newspaper *Die ZEIT* revealed that financial literacy, covering both factual knowledge and economic thinking is strongly correlated with wealth (Djahangard 2018). Comparable results were found by Grohmann (2016) and Farinella et al. (2017).

Djahangard (2018) and Grohmann (2016) were able to evidence a gender gap in financial literacy, highlighting the existing overlap between the UN-SDG Nr. 4 and the UN-SDG Nr. 5 (gender equality). In this order of ideas, if technological developments are not equally profitable for the rich and the poor, and for all genders, the SDGs are a mere unattainable utopia. Technological developments are changing the face of the world, and they should change it responsibly. The results of the aforementioned studies might imply that those developments are doing just the opposite by increasing the gap between the wealthy and the miserable, and the gap between genders. Financial literacy holds the answer in order for the Goals to be feasible in a rapid-changing world driven by technological advancements.

Businesses and capital owners should not be the only beneficiaries of new technologies. If they are, inequality and poverty are likely to broaden even if all kinds of public, private and civil society actors gather together to shape the path of sustainable development. UN-SDG Nr. 4 calls for quality education: “*All people, irrespective of sex, age, race or ethnicity, and persons with disabilities, migrants, indigenous peoples, children and youth, especially those in vulnerable situations, should have access to life-long learning opportunities that help them to acquire the knowledge and skills needed to exploit opportunities and to participate fully in society*” (UN General Assembly, 2015). Financial literacy is the knowledge

necessary to exploit opportunities rooted in new technological developments in the financial world where digitization provides nearly unlimited data. Turning that data into knowledge applicable to financial concepts and issues remains a challenge and requires specific skills.

Realizing this goal and other UN-SDGs is the vision of the UN-supported initiative Principles for Responsible Investment (PRI). PRI provides research, education, and facilitates collaboration, *“to help investors align their responsible investment practices with the broader sustainable objectives of society – as currently best defined by the SDGs”* (“PRI | SDGs,” n.d.). They actively collaborate with the United Nations Finance Initiative and the United Nations Global Compact, the largest and most significant voluntary initiative to implement universal sustainability principles of the private sector in order to support UN goals. Something that is shocking is the fact that even more financially oriented initiatives like the PRI fail at recognizing that financial literacy is a fundamental part of the UN-SDG Nr. 4, quality education, and it is not explored or insinuated in any of its principles for action.

## 2 The approach

This essay is structured as follows: first, we discuss financial literacy and the need for it when we talk about quality education. As explored above and in line with the assertion of the UN that quality education is the foundation to improving people’s lives and sustainable development, we explore how financial literacy is a vital competence to reach not only the UN-SDG Nr. 4 but also other UN-SDGs due to its relevance in a globalized world driven by digitization. This is followed by the critical exploration of a relevant example coming from the traditional financial sector in an emerging economy (Bancolombia’s InvesBot in Colombia) together with a relevant example coming from the disruptive financial sector – or FinTechs<sup>2</sup> in a developed economy (Scalable Capital in Germany). The chosen examples provide a wide perspective on the attempts from both the traditional and the non-traditional financial sectors, together with initiatives located in the Global South and in the Global North respectively.

The examples chosen differ in many aspects but are connected by three commonalities that illustrate their nature. They intend to offer cost-efficient professional investment management opportunities for people who have had restricted access to them so far, they use digitization technologies for this purpose (such as machine learning and artificial intelligence for portfolio optimization and support customer decision-making processes), and finally, they publicly declare that they consider sustainable and responsible investing, transparency, and the promotion of financial literacy to be important for the conduct of their businesses. Finally, we conclude by exploring the level of involvement desired and required of the private sector operating in the financial world to support the establishment of financial literacy in the civil society, taking a step forward in reaching the SDG Nr. 4 and promoting sustainable and responsible investment.

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<sup>2</sup> FinTech companies aim to make financial services more accessible to the general public by the use new technological developments.

### 3 The relevance of financial literacy and quality education

One-sided definitions provide grounds for debate. That might be the reason why the UN-SDGs focus on measurable and agreed-upon targets rather than on the provision of definitions of the goals. For the purposes of this essay, and in synchrony with the latter, rather than trying to provide a debatable definition of what *quality education* is, we assert that it must entail the recognition of the scope and reach of one's education, but most importantly, the ability to determine its limits. This is especially true when effectively performing in the financial world, where quality education is needed to recognize that "*specialist areas such as investments and retirement planning should be left to professionals*" (Alsemgeest, 2015).

Similarly, providing definitions for financial literacy and digital literacy can be controversial. We do not claim our definitions are universal, but for the purposes of this essay we understand *financial literacy* as "*the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being*" (U.S. Government Accountability Office, 2009). The goals of financial literacy are effective and responsible management, which are directly related to financial well-being but also academic success and an overall life satisfaction paired with psychological and physical health as explored by Shim et al. (2009) and Xiao et al. (2009). Financial literacy education is a wider process and its results include the understanding of financial products, services and concepts, empowering individuals to make informed choices (U.S. Government Accountability Office 2009: 4). By *digital literacy*, we understand both a qualified mindset and a minimum level of practical expertise concerning the use and the understanding of current processes of digitization and of practical applications in the digital world, sufficient for a 21st century basic competence in professional and other everyday activities.

Critics argue that financial literacy education is rarely quality education, as it is often ineffective and leads to biases in financial decision-making processes. Ineffectiveness refers to inaccurate decision-making due to over-confidence (i.e. spending too little time and effort on financial decisions or not asking for expert advice) or under-confidence (investing in low risk-low return types of investment) (Alsemgeest, 2015). It also refers to the inability to extract necessary information from an overwhelming amount of data, i.e. to bridge the "gulf between the knowledge, comprehension and skills of most American adults and those needed in today's market": nowadays a process related to digital literacy (Willis, 2008). For example, Campbell (2006) found that poorer and less educated households are more likely to invest poorly or not to participate in risky markets at all, due to a lack of confidence in their own abilities.

Two Goldman Sachs studies evidence the latter, revealing that the percentage of respondents investing their money in savings accounts, overnight deposit accounts, fixed-term deposits or even cash, has risen from 72.9% to 77.3% within one year. The percentage of those investing in the stock market has declined from 31.9% to 26.1% within the same period (Goldman Sachs, 2014; Goldman Sachs 2015).

Most efforts to increase financial literacy are public sector led, as governments are starting to recognize its importance. Poor financial literacy reflects in declining savings rates and an increase in debt-to-disposable-income ratios or overindebted households (Alsemgeest, 2015). As recognized by several scholars, financial literacy education is essential particularly for target audiences such as students, women, low-income earners or migrants: in

order to reduce inequality efforts to increase financial literacy should be focused, at least initially, on those groups (Karger 2015, Faulkner 2016, Schickel 2016, Grohmann 2016, Farinella et al. 2017).

Much effort is taken to integrate financial literacy courses into primary, secondary and higher education (Geddes & Steen 2016, Gil 2014). But certain research studies indicate that those efforts are not always as effective as expected (Willis, 2008). *“High school courses in money management are not providing students with the necessary skills to improve financial literacy”* (Farinella et al. 2017) and *“almost two thirds of teachers tell us financial education in the UK is somewhat or very ineffective”* (The Money Charity, 2016).

More than 15 years ago the US Federal Reserve Board's Division of Consumer and Community Affairs stated that numerous technological advances such as the expansion of the Internet had led to increases both in the complexity of the financial services marketplace and in the amount of information available to consumers. *“To benefit from the innovations, however, consumers need a base level of financial knowledge, so that they can identify and access pertinent information as well as evaluate the credibility of the source of the information”* (Braunstein & Welch, 2002). One crisis later it was claimed that stronger financial literacy education policies needed to be implemented to deal with the rapidly changing economy and the complexity of financial decisions (Dinwoodie, 2010).

#### **4 Financial-sector businesses sharing the responsibility of financial literacy education**

How to get from financial survival to financial independence is a crucial question that can be answered with quality education on financial literacy. Public sector engagement has proven not to be enough to make that transition. Private actors in the financial sector were called upon contributing to the quality of education by the UN-SDGs. Some companies, both in the traditional financial sector and the disruptive financial sector have been engaging in efforts to educate their customers financially speaking. An informed consumer of financial products and services will likely make better choices and have realistic expectations towards investments. The engagement of businesses in the financial sector in such an education can be seen as a pillar of the strategic conceptualization of corporate social responsibility. As explored in the introduction, there is a business case for companies participating in CSR activities, creating a win-win scenario for the involved parties.

Claiming a promotion of financial literacy, several companies have begun to foster different activities targeted at increasing the financial performance and awareness of their customers. The components of effective financial literacy education are explored by the American Library Association's Reference and User Services Section's (RUSA) Guidelines. The RUSA guidelines recognize that financial literacy education should demonstrate how to:

- a) *“Identify, access, and compare financial information from a variety of sources”*
- b) *“Critically evaluate the credibility, timeliness, and point of view or bias of financial information and its sources”*
- c) *“Apply financial information wisely and productively”, and*
- d) *“Use financial information ethically”* (RUSA, 2014).

In order to assess the extent to which businesses in the financial sector contribute to an effective financial literacy education will be explored in the light of the RUSA Guidelines. Financial literacy education provided by companies in the financial sector can be seen a valuable source of lifelong learning opportunities for all, filling the gap we identified above between financial survival and financial independence. Of course, schools and colleges could and should be the right place for teaching and acquiring a basic level of financial literacy supported and framed by initiatives of governments (the public sector).

## 5 Reflections on quants and quality

The financial sector has been using data for centuries. With the development of capable computers in the 1980s, algorithms have become a powerful tool to support investment bankers and traders in their decision-making processes. Those technical developments also boosted a relatively new field of science: financial econometrics. Sophisticated statistical techniques were applied to understand the dynamics of financial markets, which, in turn, allowed financial securities to become increasingly complex. Rocket science reached the trading desk. A new profession evolved from the merger of banking and mathematics, as there was an increasing demand *“for people who not only understand the complex mathematical models that price these securities, but who are able to enhance them to generate profits and reduce risk. These individuals are known as quantitative analysts, or simply ‘quants’”* (Yates, 2017).

During the millennium years, the term “algorithmic trading” became more and more popular, and the proportion of trades driven by algorithms are estimated to be as high as 90% in some specific markets (Burger, 2017). Algorithms have become popular in the financial sector to generate excess returns and to manage portfolio risks. Financial econometricians have shown that returns are almost entirely unpredictable, but they have developed mathematical models that are able to predict risk, at least to a certain extent. Even if those predictions do not rely on questionable assumptions like the normal distribution of returns, it is important to keep in mind that at some point there are assumptions – and sometimes they turn out to be wrong, either because they were wrong from the beginning or because relevant conditions have changed.

An example for the huge impact of fallacious assumptions was the collapse of Long Term Capital Management (LCTM)’s master hedge fund in September 1998. Two winners of the Nobel Memorial Prize in Economics were members of the LCTM’s board of directors: Robert C. Merton and Myron S. Scholes. According to their risk models, the losses that their hedge fund had suffered from should have been impossible under the considerations of their models (Fischer & Balzer 2017:105). However, their models were not wrong. What was wrong is the uncritical application of mathematical models to real data due to the simple and universal truth that *“we don’t know what we don’t know”*. Neither wrong were pricing models for sovereign bonds, but wrong was the assumption that states cannot go bankrupt. No one had ever questioned this assumption until Argentina’s bankruptcy, that proved that the phrase “states don’t go bankrupt” was an assumption and not a fact.

What we can conclude after this short case study is that there is always an assumption behind a model: there is always an assumption behind our interpretation of data. The interpretation of data is not part of the data. Furthermore, data and their meaning are two

fundamentally different concepts. This is one of the most basic principles of data literacy and therefore, a fundamental component of financial literacy in a digitized world. Due to the dynamics of digitization we are “*drowning in data*”. The potentials and pitfalls of Big Data analyses are hard to discern even for experts in the financial world. There is a need to understand where digitization produces knowledge and where it only produces data. Just like the pure volume of data, human beings cannot comprehend the velocity at which data are distributed any more. Beyond volume and velocity, the third criterion of Big Data – variety, i.e. the novel possibilities to analyze pieces of information that we would hardly have qualified as “data” only few years ago – exceeds our imagination by far.

We are biased towards ignoring that acting based on predictions may change future developments and that there is nothing like a law of nature when it comes to financial markets. Digitization increases the likelihood of a financially illiterate person to increase his perception that all he needs is an algorithm-based strategy and the massive amounts of available data on the Internet to realize investment returns. New technological developments in this field, like algorithm-based Robo-Advisors,<sup>3</sup> pose the risk that the relatively uninformed financial consumer feels that there is no need to deepen his financial literacy in order to better perform in the financial world. A halo effect is thus created.

What can be seen as a countermovement after the 2007 Financial Crisis is better described by Fischer & Balzer (2017): “*in the end crisis and crash revealed that the sense of responsibility in the financial sector has disappeared. Managers handed over their responsibility to the computers and simultaneously lost control over the financial system*”. It is criticized that overreliance on quantitative risk models based on past data would lead to market adaptations and therefore trigger a kind of self-destructive mechanism in the markets. Even worse, managers would trade their ability to interpret qualitative factors and economic causalities for mathematical models built on economic correlations: another risk of new technological developments based on artificial intelligence and machine learning.

## **6 The traditional financial sector & financial literacy education: Bancolombia’s InvesBot as a case study**

Acknowledgements: this chapter was written thanks to the active contributions of Prof. Jackie Arango-Zapata (CIO of Grupo Bancolombia), Andrés Felipe Rendón-Marín (eTrading Manager at Grupo Bancolombia) and his team: Lucas Betancur, Lina Hoyos and Camilo Velásquez. The authors obtained a first-hand declaration from the team behind the strategic conceptualization of Bancolombia’s InvesBot, available upon request from [santiago.galeano@stat-up.com](mailto:santiago.galeano@stat-up.com)

Traditionally, the world of investment has been associated with large opportunities of capital growth only available to large companies and those individuals with a high economic profile (wealthy and high net-worth individuals). Wealthy individuals have managed to increase their capitals throughout the years thanks to an informed access to financial markets not available to people without the sufficient economic means. Minimum capital re-

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<sup>3</sup> A robo-advisor is “a self-guided online wealth management service that provides automated investment advice at low costs and low account minimums, employing portfolio management algorithms” (Schueffel, 2017).

quirements in virtually all traditional financial organizations and intermediaries of the financial markets built a de-facto entry barrier, hindering people in the bottom of the economic pyramid to access capital growth opportunities offered by the investment markets. This dynamic managed to drastically increase the income gap between the wealthy few and the poor majority.

A Credit Suisse report of November 2017 highlighted the growing gap between the wealthy few and the poor majority: 0.7% of the world's adult population control around 46% of total global wealth while, at the other end of the spectrum, the world's poorest adults, who account for 70% of the world's working age population, account for just 2.7% of global wealth (Neate, 2017). A lack of financial literacy is only likely to continue growing this gap, invigorated by the fact that traditional financial institutions have historically put entry barriers to the poor. The report makes an emphasis on the fact that this gap has been rapidly growing ever since the 2007 financial crisis: a crisis generated by the overreliance on quantitative methods based on historical data together with overoptimistic or unrealistic expectations of uninformed investors regarding possible returns.

In spite of traditional financial institutions historically segregating at least 70% of the world's working age population from the financial system, all persons, without exception, have the need for investment either to achieve personal financial goals (financial independence) or meet some basic needs (financial survival). Commercial advisors have been directly attending these needs, structuring portfolios with different objectives like fulfilling certain investment goals or seeking to increase the patrimonies of their clients. The latter based on information offered by the markets and supported by the respective internal areas in charge of research and analysis.

The accelerated increase of data (characteristic of a digitizing world in a process of globalization), the entrance of new participants to the market, a relaxation of entry barriers and an increased access to international markets had two clear results for companies operating in the traditional financial sector. On the one hand, a wider base of customers, and on the other hand, a constantly diminished capacity of analysis due to the increase of information and limiting one-on-one commercial advice and interactions between employees from traditional financial institutions and its customers. Businesses in the sector faced a crossroad: either increasing the number of commercial advisors in order to analyze the data and give personalized recommendations (certainly not sustainable in the long-run), limit the services to high-net worth individuals (as preferred in the past) or innovate.

Grupo Bancolombia, Colombia's largest private bank and ranked by the Dow Jones Sustainability Index Nr. 1 in the Americas and 5<sup>th</sup> in the world, opted for innovation ("Recognitions," n.d.). Adapting proposals that have been used in more advanced markets since 2007, Bancolombia managed to create a high level of acceptance by the pre-existing customer base of the bank and while attracting more customers and direct more capital towards the stock market using the so-called robo-advisors: automated tools that use artificial intelligence and algorithms to analyze a large number of variables representing market information. Robo-advisors are rather flexible, making the inclusion of assets and new markets possible in a scalable way, allowing the range of investment opportunities to be increasingly broad and adjustable to the needs of the market and clients. The clients ultimately benefit not only by obtaining a recommendation based on the analysis of the information available, but also in the optimization of costs associated with the operation.

InvesBot was the name chosen by Grupo Bancolombia to its robo-advisor service. Bancolombia claims it *“seeks to facilitate the fulfillment of [its] clients' goals, identifying their main investment needs ranging from buying a home, studying, retirement or simply invest the money with a return expectation”*. The objective of the InvesBot is not to substitute commercial advisors, but to complement them. That evidences recognition by the Bank of the importance of having professional financial advisors analyzing and counseling customers so they can achieve their investment goals and with down-to-earth expectations about future returns. Giving clients a broader range of options diverging from traditional ones is an attempt of the bank to further customize investment portfolios. The InvesBot is highly sophisticated, following up the markets with a single objective in the background with the sole purpose of fulfilling a client's goal. It is constantly assessing the risks of the investments and once it determines the possibility of the goal of the client to be affected by the fluctuations of the markets, it instantly issues a recommendation of recomposition of the portfolio. Once the client authorizes the recommended recomposition, the InvesBot automatizes the execution of the actions required to accommodate the portfolio to the client's needs and market dynamics.

This implies that people are entrusting their investments to "a machine". The advantages of this being that the Robot not only takes into account all the available information at a given point in time when recommending an investment portfolio, but also analyzes markets' past performances and indicates what has been the progress of that portfolio and how it is associated with the fulfillment of the goals. All of the above would be physically impossible for human beings to do. The IvesBot still is in an introductory stage. Right now, portfolio compositions are limited to Mutual Investment Funds administered by professional financial advisors of Valores Bancolombia (the wealth management strategic business unit of the group) and a pre-selected group of Colombian Market Shares. As it is right now, investors enter in a controlled-risk environment, backed by professional financial analyses.

In its introductory stage, the InvesBot is initially available exclusively to the existing clients of the Stock Brokerage strategic business unit of the bank. The minimal capital requirements in order to access the service is \$6 million Colombian Pesos, or the equivalent to \$2.100 USD by the time this essay was written (25.03.2018). This capital requirement is much lower than most of its competing alternatives coming from the traditional financial sector. Nevertheless, and put into perspective, that number is equivalent to around 7.7 times the monthly minimum wage in the country. It is because of that, that it is difficult to affirm that the bank is actively contributing to narrowing the income gap and reach equality in line with UN-SDG Nr. 10: reduced inequalities. That in spite of the declarations of the officials of the bank that defend the idea of making this service available to historically relegated parts of the population.

Bancolombia's highest-ranking officials are known by being vocal about the bank's commitment with the financial education of the country. Therefore, it is not a surprise that they offer customers a wide range of possibilities targeted at increasing their financial literacy. Several instruction booklets, informative videos, the possibility to empirically test the bot in a fictitious scenario before investing setting realistic goals and using up-to-date market information together with a customer service mailbox ([etrading@bancolombia.com](mailto:etrading@bancolombia.com)) and periodic virtual, interactive seminars and conferences are a proof of the ongoing commitments of the bank to attain the UN-SDG Nr. 4: quality education.

The virtual talks are not limited to the functioning of the robo-advisor, but seek to contribute to the knowledge of people interested in the products of the stock market. The virtual talks have covered so far topics such as: variable income, fixed income and derivatives, fundamental and technical analysis, international markets and the risks associated with investments in which around 10,000 people have participated in the past 3 years. Most remarkable, the talks are available to both customers and non-customers of the bank.

In particular, virtual talks focused on the InvesBot were available to the public several times a week shortly after its introduction, and since 2018, once a week. Additionally, the clients of the Stock Brokerage strategic business unit of the bank had the opportunity to attend different forums across different cities of the country, offering group and customized training. Bancolombia, comprehensively carrying out its financial education duty, gives its employees constant training on concepts and functionalities so they are prepared to integrate new technological developments to their day-to-day jobs.

Critically assessing Bancolombia's efforts towards the attainment of the UN-SDG Nr. 4 in the framework proposed by the RUSA Guidelines, we can affirm that there is a lot to do to fit their financial education possibilities to them. First of all, regarding item a) it is questionable that Bancolombia's customers are able to identify, access and compare financial information from a variety of sources: it appears to be that this process is all automatized by the InvesBot, or insights are provided by its traditional commercial advisors.

Item b), exploring the evaluation and credibility of financial information and its sources is completely absent in the InvesBot: customers cannot access the underlying assumptions of the models and algorithms used by the robo-advisor when it gives certain recommendations. Even if they could access those assumptions, those would be impossible for an average consumer to understand given its specificity. Such topics are also left out from the seminars, forums and virtual talks of the bank. Item d), including the ethical implications of investments as a fundamental part of financial literacy is not present in any of the attempts of the bank to educate its customers and employees. In spite of the not so clear fit between the RUSA Guidelines and Bancolombia's attempts to increase financial literacy, the bank appears to be giving strides towards the right direction, actively and voluntarily playing a role in the sustainable development of all its stakeholders.

## **7 FinTechs & financial literacy education: Scalable Capital as a case study**

Scalable Capital was founded in Munich in 2014 and offers digital wealth management services using a robo-advisor. Their motto: „A Unique Investment Service, Powered by Data. Giving you a precise understanding of portfolio risk“ (Scalable Capital, 2018). Their portfolio optimization approach is based on quantitative academic research and is described in detail in a whitepaper (Scalable Capital, 2016). The whitepaper explains how several measures of risk (like VaR) are used for their investment process. It provides the users with the respective mathematical definitions, and discusses also their criticism, illustrated by several computational examples. At least some basic statistical and econometrical knowledge at the level of an undergraduate course is required to understand the definitions and calculations.

Scalable Capital clearly states that “it is very difficult, if not impossible, to give reliable predictions of future price developments based on historical price developments. The difficulty lies in the prediction of price direction. In contrast, the systematic prediction of financial market risks is quite a reasonable undertaking. Financial econometrics has developed successful models for risk prediction for the last two decades. Fundamental academic works to this go back to the financial econometrician Robert F. Engle who was awarded for them with the Nobel Prize in 2003. Scalable capital uses the fact that market risks are predictable and uses further developments of Engle’s work in doing so” (Scalable Capital 2016:25).

Scalable Capital provides its clients with a series of different resources that are available for consultation in its website. A media library and a blog, together with a series of webinars and events advocate for the financial literacy of the clients using the digital investment platform. A newsletter is available upon subscription. A media library is presented in four subcategories comprising general information about the company, quick insights to the nature of financial markets, a subsection with deeper and more critical analyses, and a last one explaining the nature of its individual savings account product (Scalable Capital 2018).

The content providing an approximation to financial topics is remarkably limited in the media library, with 21 related videos and 1 document available for download. One of the videos is titled “Building Wealth Tax-Free” and sheds light to a practice known as tax avoidance. Tax avoidance, in contrast to tax evasion, is totally legal but remains to be an ethically questionable practice. The discussion of whether this topic should be a part of a universal and agreed upon definition of financial literacy in line with the nature of the UN Development Goals, remains open.

We could attest that the contents published in one subcategory are replicated in other subcategories: this makes us question if there is a real commitment to financial literacy or if they publish contents only as a purely marketing vehicle to attract new customers and not to educate current ones. An investment summit due to the 20th of March in the city of London is designed to provide “an overview [to their] investment approach and proprietary risk management technology” and cannot be considered as an instrument that purports financial literacy: it is merely a promotional effort (Scalable Capital 2018).

The blog covers a variety of different investment topics. Several aspects from the white-paper mentioned above are discussed there as well in an easily readable way, often illustrated with figures and statistical analyses. The blog seems to aim at promoting financial literacy of its readers although this is not explicitly stated. At least one of their blog articles argues that “financial education is more important than ever as children are increasingly exposed to the temptations of consumerism” (Rabener, 2018). The various categories of the blog include “financial planning”, “investment for retirement”, “investment strategy”, “financial research”, “FinTech disruption” and “women and investing”. The overlap of financial literacy as a constitutive part of UN-SDG Nr. 4 (quality education) and UN-SDG Nr. 5 (gender equality) is noticeable in the last category and deserves recognition.

The blog is dense and in the quest of assessing its alignment to the provided definition of financial literacy, we decided to critically explore the articles around two main axes: form and contents. Regarding the form, the underlying assumptions they use defending that their methods are “low risk” have an unethical dimension to them. A model developed by a Nobel laureate, together with big data and sophisticated algorithms does not provide a

diversion from the inherent risks of financial markets. The characteristics of their proprietary risk management technology are attractive to uninformed potential customers and serve as a sharp marketing tool. A model developed by a Nobel Laureate is not a quality criterion by nature, even if the uninformed consumer perceives it like that.

As discussed above and as insightfully coined by one of the financial moguls Warren Buffet's most famous quotes: "We have long felt that the only value of stock forecasters is to make fortune-tellers look good." Past performance rarely proves to be a good indicator of future performance of variable financial asset returns. Scalable Capital's attempt to increase the financial knowledge of its clients is valuable. Fundamentally problematic, however, is the way key indicators are discussed: a casual reader might interiorize the impression that one can make the right investment decisions solely through pure data analysis, possibly combined with financial mathematical models. Many of these key indicators and models (VaR, GARCH), as explored in the past section, are not undisputed.

An article titled "Don't Be Fooled by Returns Alone" by Adam French (2017) describes which key figures lead to which erroneous conclusions, or why one should rather look at the return-drawdown-ratio. This example illustrates how problematic the valuation with such ratios is, invigorated if one does not understand in detail the scope of their strengths and weaknesses. Therefore, there is a risk that such a blog escalates the illusion of financial literacy in the reader where in fact, there is none.

From the contents of their blog, it appears that Scalable Capital uses Monte Carlo simulations for each individual portfolio, increasing the perception of its customers that they are going to meet their target VaR. The latter is beneficial for the already informed investor who believes in data-based strategies. Nevertheless, every prediction relying on past data is like driving a car using only the rearview mirror, no matter whether they are model-based or purely data-based. This also applies to simulations that can only include information from the past (or assumptions about possible future scenarios, automatically making them subjective). Even predictions based only on past information imply the assumption that the past can tell us anything about the future. Therefore, it is self-deceptive to argue that those predictions are objective. It is outstanding that Scalable Capital explicitly says, as already explored, that "it is very difficult, if not impossible, to give reliable predictions of future price developments based on historical price developments" but then incorporates such methods and uses their articles to increase their clients' confidence in the reliability of those.

Further analyzing the contents of the blog, none of the article provides a substantial context to purport the understanding of why markets react, how they react, how bubbles are created, etc. Most of them can be defined as a one-sided advice from current employees and analysts. In this order of ideas, it would make no difference to invest the money in a mutual fund, where an expert takes the decisions on how to diversify the portfolios' assets (combining fixed and variable ones) for reducing the inherent risks of investing in the financial market.

The lack of context and the one-sidedness of the articles directly contradict item a) of the RUSA Guidelines for financial literacy education that exposes the necessity for such an education to allow for the identification, access and comparison of financial information from a variety of sources. In addition to that, some of the articles appear to be masking underlying interest of the company. An article titled "Secrets Your Bank May Like to Keep"

by Simon Miller (2017), UK CEO & Co-founder of Scalable Capital, undermines the reputation of traditional financial institutions allegedly, to drive savings out of them and direct them to their “more transparent” platform.

Concluding, the major problem of such a blog is that it fuels the expectations of its readers, and those expectations are only partially realistic. In that sense, RUSA Guidelines item c) describing the wisely use of financial information is negatively affected by the blog if a client decides to base his decisions solely on the articles’ contents. Scalable Capital makes no explicit promises of returns, and they affirm that they just provide a means for limiting the risks. However, the unrealistic expectations they help to boost are reflected in their Google reviews, where people are rather dissatisfied with the realized returns. Even though Krink (2018) tries to explain why Scalable Capital’s “*eliminates the negative influence of emotions (...) with the aim of deriving sound long-term investment decisions*”, Scalable Capital does apparently not succeed in making it clear to clients that zero risk means practically zero returns and “no algorithm can perfectly predict the timing of the stock market collapses”. This may be regarded an indicator of the inefficiency of Scalable Capital’s attempts to increase financial literacy.

To be just, there is a shared responsibility between private actors, the public sector and the global civil society in attaining the UN-SDGs. Translating this responsibility to a private actor like Scalable Capital would be a burden for them and would make the UN-SDGs unattainable. We do not expect FinTechs to assume the entire financial literacy duties as an integral part of UN-SDG Nr. 4, but FinTechs should be transparent, honest and accountable for what they publish.

Further discussing our previous assertion that there might exist an overlap between UN-SDG Nr. 10 (reduce inequality) and the fact that Scalable Capital offers its services at a “low cost with low initial capital requirements”, we can affirm that there is not enough empirical evidence to support that claim. The lack of access to financial services of people in “the base of the pyramid” would just further increase the income gap between the poor and the rich, the global north and the global south, developed and emerging economies. A minimum capital requirement can be equated to an entry barrier for people not having the necessary resources, in the same way the lack of financial literacy constitutes such an economic barrier and disincentive a fair and informed use of the possibilities opened by technology advancements related to financial markets.

## **8 Conclusion**

There is a need for private actors to play an active role in sustainable development. The public sector and civil society actors alone cannot take all the burden of achieving the UN-SDGs. We hold that financial literacy might be one of the determinants for the achievement of the UN-SDG Nr. 4: quality education. We also defend that quality education is the foundation to improving people’s lives and sustainable development just as recognized by the UN. Financial literacy should be, in our opinion, included as one of the constitutive, measurable targets of quality education. Without financial literacy, there is no possibility for the UN-SDG Nr. 1 (no poverty), 10 (reduced inequalities), 5 (gender equality), and 12 (responsible consumption and production) to be attained. A lack of an informed access to financial markets will broaden the gap between the wealthy and the poor, and between

genders. Ethical investment as an element of financial literacy has a clear overlap with responsible consumption of financial services.

The subtle, but important relevant interrelationships of UN-SDG Nr. 4 with all the others requires that we pay close attention to this specific goal. Efforts of the private sector to increase financial literacy are widespread, but are sometimes biased to the achievement of certain underlying interests of private actors as evidenced by the case study of Scalable Capital. Bancolombia proves that engagement from the private sector can be different and more inclusive, truly creating a basis for the attainment of the goals. Without a definition of the characteristics of financial literacy, and without the inclusion of it as one of the targets of the UN-SDG Nr. 4, it is unlikely that all private actors work in the same direction.

Some adverse effects are to be expected from deficient financial literacy education such as unrealistic expectations of customers regarding returns and a hubristic sentiment that is rooted in new technological developments. Those developments pose threats and opportunities: threats if over-trusted and not understood, and opportunities if well interpreted and used as additional means to attain the goal of financial independence. The digital and the financial world have become so omnipresent that responsible investment needs a corresponding level of literacy. Financial literacy comprises basic concepts, an understanding of principles and methods as well as a feeling for risk and uncertainty, chances and collaterals or side effects. Beyond common definitions, we propose a more general view on concepts such as quality education, financial literacy and digital literacy to explain why these concepts are strong prerequisites of sustainable investing and how they should be regarded in the contexts of ongoing technological developments and civil society.

As of right now, there is no consistent roadmap for lifelong learning opportunities regarding financial literacy education: private, public and civil society actors have failed to set a blueprint and recognize the overarching importance of financial literacy for sustainable development. This essay is innovative in the sense it aims at providing such an initial blueprint. Businesses are considered to be actors that hold certain obligations and responsibilities within the civil society. The cases explored provided some examples for attempts of the private sector to increase financial literacy in the form of "company academies", "learning hubs" and other types of structured educational efforts targeted to employees and customers.

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