

# The Signature Impact Framework: an Application to Financial Literacy

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## ABSTRACT

Impact investing is a financial investment model that aims to generate positive social and environmental impact, as well as a financial return. However, one of the major roadblocks facing the industry is the lack of high-quality impact data to prove the effectiveness of interventions. The Signature Impact Framework (SIF) aims to address this issue by providing a methodology for conducting a rigorous, actionable, and cost-effective assessment of the impact of a given business. The SIF process involves three stages, allowing ex-ante impact underwriting, interim impact reporting, and ex-post impact additionality assessment.

SIF is developed under the premise that better impact measurement allows more transparency and efficiency in impact investment decision-making. By applying the framework in the field of financial literacy, the paper pilot provides a glimpse of how SIF can be used in practice. We claim that the adoption of measurement systems such as SIF would increase confidence in impact investment opportunities, which in turn would mobilize large-scale investments from institutions that have been hesitant to embrace sustainable investments thus far.

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## 1. INTRODUCTION

Impact investments are made with the intention to generate positive, measurable social and environmental impact alongside a financial return. This financial investment model is an important building block to reaching the UN Sustainable Development Goals (SDGs). It provides additional private capital to alleviate pressing global problems, such as sustainable agriculture, renewable energy, or affordable and accessible basic services. According to (UNCTAD, 2014), the pre-COVID-19 annual additional investment needed to achieve meaningful progress in sustainable development by 2030 amounts to \$2.5 trillion. However, the pandemic and international conflicts have since created economic aftershocks that significantly widen this investment gap to USD 4 trillion annually, stressing the clear demand for more efforts in mobilizing private financial resources towards societal ends (OHCHR, 2022).

In 2022, the impact investing industry reached a new record in assets under management of USD 1.164 trillion (Dean Hand et al., 2022). However, it is still faced with various constraints to exploit its full potential. One of the major roadblocks continues to be the lack of high-quality impact data to prove the effectiveness of an intervention. If there were a transparent and robust framework for evaluating the impacts of intervention, along with more available data to help investors make informed decisions, investors could reduce due diligence costs and make more impactful investment decisions. This lack of data affects all stages of the investment process: Before a transaction, when investors need information on proven interventions to identify valid targets; during the holding period, when the investors need to monitor and assess the portfolio's social and environmental performance; and at the exit, when investors need conclusive evidence about the impact generated along with financial returns during the lifetime of the project.

## 2. THE SIGNATURE IMPACT FRAMEWORK

The Signature Impact Framework (SIF) aims to address this issue by providing companies and investors with a blueprint to conduct a rigorous, actionable, and cost-effective assessment of the impact of a given business. The key principle underlying SIF is that while the overall effects of an enterprise on society are extremely difficult if not impossible to measure, companies can demonstrate if and how they are intentionally delivering positive change along a clearly defined set of goals enshrined in their mission. We call this “signature impact”, which denotes the precise and distinctive contribution that a business can make to societal welfare.

The impact measurement literature is immense given the multiplicity of efforts displayed in the field by development finance institutions, investors, and academia (see International Finance Corporation (2019) and So and Staskevicius (2015)). We have extensively reviewed the various approaches by different organizations and annotated possible strengths and weaknesses in [this file](#). To the best of our knowledge, we could not find in the literature reference to the signature impact approach as we describe it. While proposing a novel concept, the building blocks of the Signature Impact Framework (SIF) will strictly adhere to the best practices identified in impact measurement.

SIF is designed as a three-stage process following the life cycle of the investment. Ex ante, and thus prior to the investment, the investor carries out the Signature Impact Underwriting, aiming at stating and validating the business’ Theory of Change and mapping it to the SDGs. The interim stage foresees the Signature Impact Reporting, whereas suitable metrics and KPIs on the expected outcomes are reported. The final stage of SIF, the Signature Impact Additionality Assessment, consists of a full-fledged statistical analysis using quasi-experimental methods aimed at quantifying the impact achieved in a given time span by benchmarking against control groups.

**Figure 1:** Stages of Signature Impact Framework

STAGE	OBJECTIVE	TYPE OF ANALYSIS
ex-ante	Validation of Theory of Change	Signature Impact Underwriting
interim	Definition of metrics and KPIs	Signature Impact Reporting
ex-post	Measurement of achieved impacts	Signature Impact Additionality Assessment

A basic milestone of SIF is the identification and review of the problem’s context such as the extent of the issue, its geographic scope, underlying root causes and affected stakeholders, followed by a comprehensive collection of evidence about previous interventions in the field worldwide from peer-reviewed journals, practitioner reports, documents from international organizations, consultancies, and NGOs. This research effort will generate a database including all relevant information defining each intervention such as geography, year of implementation, level of evidence, sample size, stakeholder group, etc.

SIF is developed under the premise that better impact measurement allows more transparency and efficiency in impact investment decision-making. By committing to SIF, fund managers and institutional investors signal their intention to confidently measure

their impacts along with financial performance, fostering the credibility of their investment strategies towards their internal stakeholders and society at large. Importantly, the availability of dependable impact data would also allow the design of more comprehensive managerial incentives based also on the positive changes that business makes to society. The adoption of measurement systems such as SIF would ultimately increase confidence in impact investment opportunities, which in turn would unlock large-scale investments from institutions that have been hesitant to embrace sustainable investments thus far.

### 3. SIF AT WORK: THE CASE OF FINANCIAL LITERACY

#### 3.1 The problem and its context

In what follows, we try to pilot SIF in the field of financial literacy, a topic with special relevance in the United Arab Emirates (UAE). Financial literacy is defined as the knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply these in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life. Ultimately, financial literacy aims for the financial empowerment of individuals and the overall stability of the financial system.

The UAE is facing significant challenges in this field: According to a Standard & Poor survey from 2015, only 38% of adults in the UAE are financially literate (Cleofe Maceda, 2015). The issue is specifically worrisome among young people, aged 18-24 years who represent roughly 10% of the overall population. According to the (Emirates Foundation for Youth Development, 2012), studies from 2011-2012 have shown that 70% of participants have no prior financial planning and 70 - 80% of debts were spent on acquiring luxuries rather than basic items. The foundation predicts that a youth debt crisis can threaten the UAE society and economy. More recently, a report by VISA highlighted that 43% of youth respondents (16-24-year-olds) believed they were not readily trained well to manage their own money . Additionally, 53% of respondents said that their current schooling did not prepare them for financial management (Adul Rawuf, 2022).

More specifically in Abu Dhabi, the government has collected evidence in its latest Quality-of-Life Survey that financial literacy is one of the major issues of concern for the Emirate's citizens and residents today. The responses given in the survey indicated concerns about financial planning and failing to save, difficulties in managing and repaying debt and excessive spending on luxury items encouraged by social and peer pressure. Financial difficulties and worries loom large among the social challenges that Abu Dhabi faces across all sectors of its population and not having an adequate understanding of financial topics carries a cultural and societal stigma resulting in individuals typically not reaching out for help until it is too late (Salama Al Ameen, 2022).

Regarding different segments of the population, a lack of financial literacy has a disproportionate effect on women and young people. Senior citizens are also affected by the survey finding out that 84% of them had not started to financially plan for their retirement, a general lack of awareness and training to enable better retirement readiness and a perception that existing pensions were inadequate (Salama Al Ameemi, 2022).

In addition, Emiratis are also vulnerable to financial (cyber) fraud. According to the 2017 Norton Cyber Security Insights Report, over 3.72 m UAE customers lost AED 3.86bn from financial cybercrimes. 52% of the 1,059 UAE respondents experienced cybercrime, with each victim losing an average of AED 669 and spending 47.9 hours or the equivalent of about six working days dealing with the cybercrime's aftermath (Dempere & Malik, 2021; Riaz Naqvi, 2018).

In addition, it is important to consider that a lack of financial literacy should not only be measured in terms of economic statistics – the evidence suggests that financial insecurity is also strongly linked to high levels of stress and poor health.

## 3.2 The FinLit Signature Impact Database

To enable an overview of possible interventions in the field of financial literacy and potentially impactful interventions, we have created a proprietary database comprising over 250 FinLit studies. As of now, 100 of the studies on different financial literacy interventions have been reviewed and annotated, detailing information such as intervention type, a vector of beneficiaries, research methods, and financial literacy indicators. It was developed and refined based on a systematic review study conducted by (Miller et al., 2014).<sup>1</sup>

Currently, the database comprises studies from 35 nations from 1979 to 2022. The data collected from each paper includes various components such as the authors, title, year of publication, a summary of the research, country of study, sample size, the overall impact of the intervention, subgroup impact, whether the study was a randomized controlled trial (RCT), the intensity of the intervention in terms of hours of exposure, whether there was a teachable moment, the subgroup targeted by the intervention, the type of intervention (e.g., individual counselling or classroom-based seminars), the outlet where the research was published, and the Sustainable Development Goals (SDGs) targeted by the intervention. These components provide important information that enables researchers to understand the context, methodology, and findings of each study and allows for further statistical analysis. Based on this research, five different categories of interventions can be distinguished:

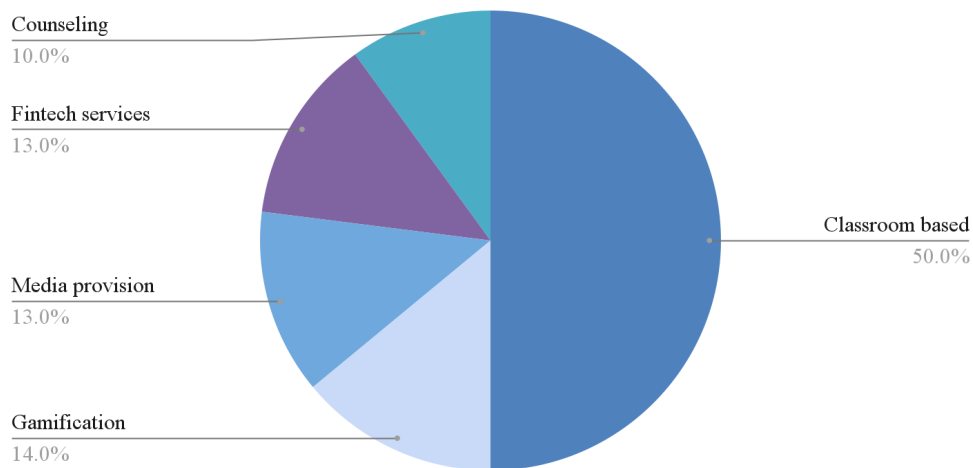
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<sup>1</sup> The beta version of the database is available upon request.

1. **Financial literacy stimulation & game:** Imitation of financial scenarios through games, virtual prompts, and simulations for participants to learn from doing;
2. **Financial management apps:** Applications that include accessible financial tools to encourage financial literacy and participation;
3. **Tutoring & classroom-based interventions:** Classes and lectures that provide financial knowledge;
4. **One-to-one & One-to-few counselling:** Targeted, small-scale engagements to guide and mentor targets' financial literacy and behaviour; and
5. **Media information provisions:** Distribution of financial literacy material through texts, posters, videos, and advertisements.

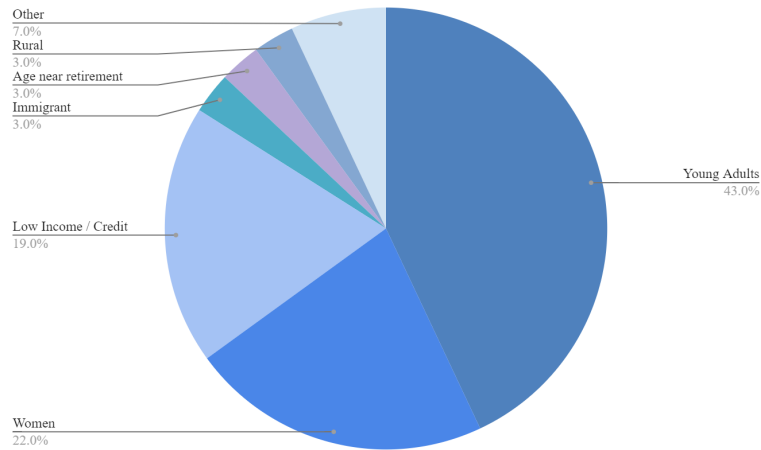
Out of the 100 reviewed pieces of literature, 50 interventions are classroom-based seminars, followed by 14 gamification interventions, 13 financial management applications, 13 media information provisions, and 10 counselling interventions (**Figure 2**). The main beneficiaries of these interventions can be categorized as low-income/credit individuals, women, immigrants, SMEs, rural populations, individuals nearing retirement age, and students & young adults. (**Figure 3**)

**Figure 2:** Distribution of Interventions



*Source:* TIL FinLiT Signature Impact Database

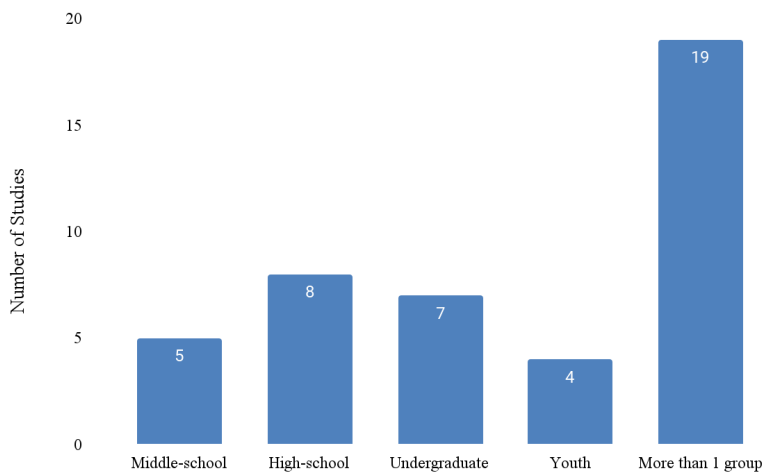
**Figure 3: Type of Beneficiary**



*Source:* TIL FinLiT Signature Impact Database

The reason for most interventions targeting these subgroups is that these are some of the most marginalized populations when it comes to financial literacy and exposure to financial tools and education. The lack of financial literacy among these subgroups prevents them from establishing financial stability and individual empowerment, raising macro-level social concerns. Interestingly, scholars in this field have shown interest in youth and students, who account for nearly half of the total number of papers. To prepare youth for financial literacy, scholars have evaluated multiple interventions for students ranging from primary to undergraduate levels. **Figure 4** displays the number of studies conducted for each group of youth and students.

**Figure 4: Distribution of Financial Literacy Interventions on young beneficiaries**

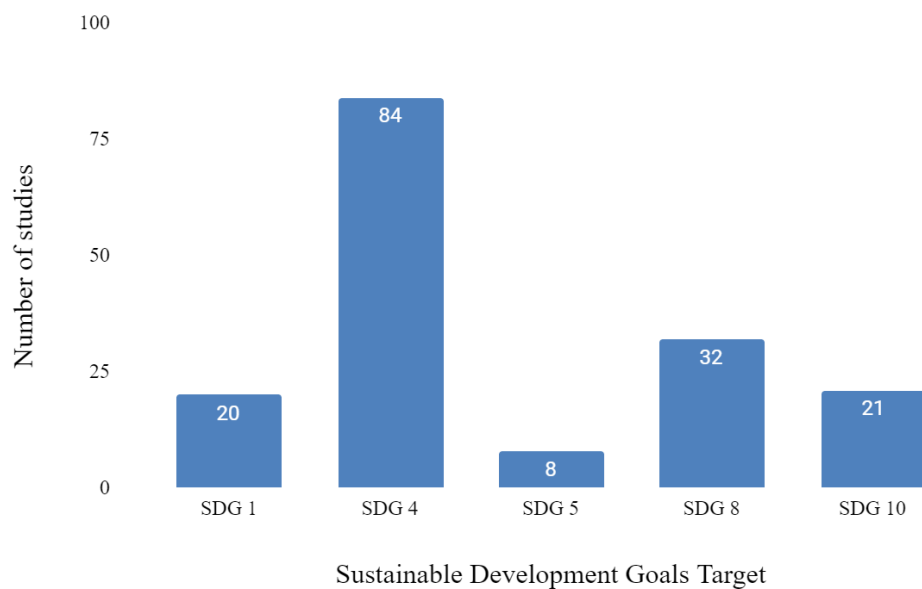


*Source:* TIL FinLiT Signature Impact Database



The database also categorizes the studies into their respective SDGs goals (**Figure 5**). The most frequent SDGs for the topic of financial literacy are SDG 1 "No Poverty", SDG 4 "Quality Education", SDG 8 "Decent Work and Economic Growth", and SDG 10 "Reduced Inequalities." The rationale behind such categorization is to help organizations that aim to promote the SDGs have easy access to metrics and studies relevant to their interested field of impact.

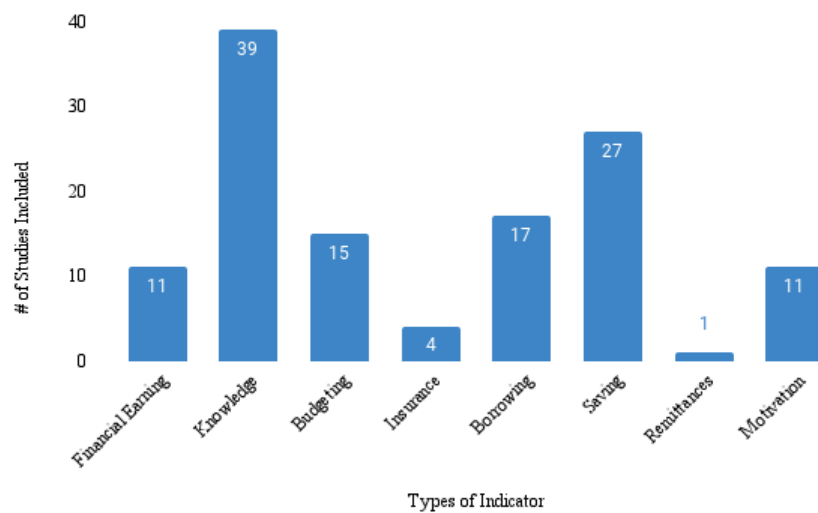
**Figure 5:** Distribution of Financial Literacy Interventions Across SDGs



*Source:* TIL FinLiT Signature Impact Database

Among the 100 fully recorded interventions, we categorized them into higher-order groups to derive a set of eight overarching impact metrics that contextualize the effects of financial literacy interventions (as shown in **Figure 6**). Two of the indicators (knowledge and learning motivation) address general changes in attitudes, while the other six specifically capture changes in behaviour:

1. **Knowledge:** Changes in financial knowledge, behaviour, and awareness;
2. **Learning motivation:** Learning/seminar participation, the future willingness of financial participation;
3. **Financial earning:** Changes in earning/financial returns post-intervention;
4. **Budgeting:** Changes in spending habits, asset allocation, and accounting attempts;
5. **Insurance coverage:** Changes in insurance participation and take-up;
6. **Borrowing:** Changes in credit ratings and/or loan activities;
7. **Savings:** Investment, pension, and savings participation; and
8. **Remittances:** Control over remittance activities.

**Figure 6:** Distribution of Indicators Observed Across Interventions

Source: TIL FinLiT Signature Impact Database

It is critical to underscore that, in the interventions recorded in the database, the impact is measured in a *subjective* manner in 31 cases through self-reported surveys intended to measure confidence in financial topics and behaviours across the eight indicators outlined above. Within the 31 cases, 15 studies also incorporate a mix of objective indicators to measure the intervention impact. The remaining interventions only include objective indicators that measure an intervention’s impact on financial literacy through financial data, standardized tests, etc. *Objective* data to delineate a more empirical analysis of the effects of the interventions is observed through available banking data of participants in savings, debt, and credit, as well as knowledge-based assessments to measure the individual’s familiarity with financial topics, rather than measuring a hypothetical behaviour or confidence level. See **Appendix 1** for an overview of some of the subjective and objective indicators that measure different aspects of financial literacy:

While 73 out of the 100 interventions analyzed were considered to have objective or subjective impacts on beneficiaries’ financial literacy, the rigour of the evaluation process is highly heterogeneous. For instance, an RCT study provides a higher level of evidence compared to a study that only employed interviews and anecdotes to evaluate impacts. Additionally, studies with longitudinal elements will give investors a better understanding of whether the intervention will create long-term impacts. Therefore, besides outlining the metrics used to measure the impact of interventions on financial literacy, the database also provides information on the methodology used to evaluate impacts. Studies with a high level of evidence include those with these measurement methodologies:

- (1) The presence of a Randomized Controlled Trial (RCT) or quasi-experiment;

- (2) Comparison of pre-post intervention results through baseline & follow-up measurements; and
- (3) Longitudinal effects contextualized through long-term follow-ups.

The first two components allow researchers to draw difference-in-difference estimations to account for both cross-sectional and time-variant characteristics that may be relevant when measuring the relationship between intervention and impact. The third feature allows illustration of whether or not the interventions obtain a long-term, persistent effect on financial literacy for the participants who participate in an intervention. Out of 100 studies, only 41 employed at least one of the above evaluation methods. Specifically, 33 studies employed RCTs, 8 studies employed difference-in-difference estimations, and 10 articles studied the longitudinal effects contextualized through long-term follow-ups.

### 3.3 Stage 1. Signature Impact Underwriting (SIU)

The first stage of the SIF consists in underwriting the expected signature impact of a specific intervention. For this purpose, the theory of change (ToC) of the proposed activities is validated against the data retrieved on financial literacy interventions. The ToC (also referred to as Logic Model or Results Chain) is a hypothesis about why a desired effect is expected to materialize in a particular context. To do so, it causally links the planned activities to a desired impact.

Before laying down the ToC of a given intervention, SIU foresees a preliminary qualitative analysis of the relevance of its intervention in the potentially affected area (SDGs, region, country, community, stakeholder group). Reference is made to the extent of the problem (i.e., how many people are affected) and urgency (i.e. what the consequences of it are if it is not addressed). The analysis is currently made on a case-by-case basis based on the researcher's individual judgement but going forward standardized brackets should be used for specific problems in order to allow for a quantitative assessment. The preliminary analysis is complemented by an *ex-ante* assessment of the organization's experience and capacity to implement the proposed intervention successfully. For example, a proven track record in similar projects contributes to obtaining better scores at the underwriting stage.

**Figure 7:** The preliminary valuation scorecard

	Expected impact																
SDG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Extent of the problem	Low						Medium						High				
Urgency of the problem	Low						Medium						High				
Organization efficiency	Low						Medium						High				

*Source:* TIL FinLiT Signature Impact Database

The subsequent stage of the SIU process is the identification of the ToC where the specific attributes of a proposed intervention are identified. The detailed metadata classification reported in the FinLiT database allows a precise benchmarking of the intervention against the available historical evidence of achieved impacts in financial literacy programs. The expected impact is measured in terms of the success rate (namely the share of documented impactful projects over the total number of projects) by country, type of intervention and type of beneficiary. The three individual pillars will then be aggregated to generate a score measuring the joint probability of impact conditional on the country, type of intervention, and beneficiary.<sup>2</sup>

#### *SIU in practice: an example*

We apply our methodology to evaluate the ex-ante impact of an intervention using a classroom-based approach to foster financial literacy among Italian students. During the school year of 2008-09, the Bank of Italy and the Italian Ministry of Education introduced an experimental program to incorporate financial education into school curricula. Within this program, teachers received training on financial topics and then introduced these in their classroom teaching.

Within the database, classroom-style interventions have been mapped mostly to SDG 4 (21 times), followed by SDGs 8 (7), SDGs 1 (5), SDG 5 (4) and SDG 10 (3). Regarding the implementation and proven evidence of similar interventions, we find one study from Italy within our sample, 30 from the US, 4 from India, 3 from Mexico, 2 from Indonesia

<sup>2</sup> In this preliminary version of SIU score, we are assuming statistical independence of the three categories used in the analysis.

and a variety of single studies from other countries (Tanzania, Bosnia-Herzegovina, Brazil, China, Sri Lanka, Uganda and Ghana).

Regarding the extent and urgency of the problem, Italy has reported below-average scores in the 2015 OECD assessment on financial literacy for 15-year-old students. Some 20% of students in Italy do not reach the baseline level of proficiency. With a mean score of 483 points, Italy ranks between 7th and 9th among all 15 participating countries. Italy also lags behind other developed countries with 37% of financially literate adults (OECD, 2015). The preliminary evaluation suggests that the issue of financial literacy is relevant and urgent. Considering that the project's implementation placed additional demands on teachers and schools, it can be inferred that the level of organizational efficiency is moderate. The result of the preliminary stage of the SIU for this intervention is summarized in the scorecard below using the **Figure 7** template.

**Figure 8:** The preliminary valuation scorecard for the classroom-based intervention to foster financial literacy among Italian students

	Expected impact																
SDG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Extent of the problem	Low						Medium						High				
Urgency of the problem	Low						Medium						High				
Organization efficiency	Low						Medium						High				

Source: TIL FinLiT Signature Impact Database

Upon the implementation of the preliminary stage of the SIU, the subsequent, more quantitative evaluation of the probability of success of a given intervention, harkening to the context, in terms of geography, beneficiary, and intervention type. At this stage, a joint probability between the three variables will be calculated with data derived from the FinLiT Signature Impact database. In the example, we are to calculate the joint probability for an Italian-based, classroom intervention that is focused on secondary school students to have an overall impact. Prior to the calculation of the joint probability, it should be noted that independence is assumed between the three variables; therefore, the joint probability will be calculated as

$$Pr(Success_{Italy}) * Pr(Success_{classroom}) * Pr(Success_{secondary}) = Pr(Estimated Success)$$

From our database,

- 50% of Italian financial literacy interventions have an overall impact
- 76% of classroom-based interventions observe an overall impact
- 71.4% of interventions with secondary school students as beneficiaries have an overall impact

Therefore, the probability of success of the example study, in terms of its geography, intervention type, and beneficiary, is **0.2714**.

The SIU process thus provides the investor with an *ex-ante* qualitative metric of the relevance of the intervention, along with a score measuring the likelihood of impact achieved by similar initiatives, using the most recent and comprehensive available evidence.

### 3.4 Stage 2. Signature Impact Reporting (SIR)

The second step, the Signature Impact Reporting, identifies which metrics or KPIs should be used when assessing a specific intervention and what the data shows in terms of measurement approaches used.

The identifications of these impact indicators in observing specific interventions, with characteristics indicated in the SIU stage, the SIF Proprietary Database can be used to locate studies with their interested financial behaviour to identify the metrics to measure the outcome of saving behaviour. As mentioned in the overview of the database, indicators across 8 areas are identified, and **Appendix 1** consolidated the most frequently observed measurement metrics used in the 100 analysed literature.

In a similar vein to SIU, the interim reporting stage will refer to extant evidence about metrics more frequently used in benchmarked interventions. The categorization reported in the database will allow us to identify the sub-group of comparable studies and the suitable KPIs that have been more frequently used. The final choice will be made by considering the overlapping set of KPIs in similar studies, or their combination if different sets have been used.

By reporting the targeted and achieved outcomes during the investment period, relative impact performance against the set objectives can be calculated and used to monitor the execution of the project.

#### *SIR in practice: an example*

Returning to the case study that evaluates the impact of financial literacy classes in Italy, while the number of students and the number of teaching hours would constitute

a solid basis for further impact measurement, the assessment of the key KPIs identified in existing studies on classroom-based interventions with secondary school students as beneficiaries in the SIR stage helps investors identify the correct metrics to measure the impact of the given intervention in the example.

Referencing the database, among the studies analysed that fit the criteria of classroom-based interventions and secondary students as target beneficiaries, actual change achieved have been measured on all 8 areas of KPI, except for insurance coverage and remittances:

- **Knowledge:** standardised test with content in financial instruments, pension, savings, borrowing, risk, policies, consumption, budgeting, etc
- **Learning Motivation:** the self-reported willingness for setting financial goals
- **Financial earnings:** income generation (Y/N and currency value) or ratio of net worth to earnings
- **Budgeting:** expenses (monthly), behaviours like budget plans and comparison shopping (Y/N or subjective self-reports)
- **Borrowing:** whether or not they've borrowed money, are they behind on payment
- **Savings:** bank account participation, deposit size

Within the database, there are 8 existing studies that fit the criteria of classroom interventions and secondary students as beneficiaries, out of which financial earnings, budgeting, and borrowing are reported by 2 studies, savings by 3 studies, and financial knowledge reported most frequently, by 4 out of the 8 studies used as benchmarks.

It should be noted, that while insurance, remittances, and motivation are all unreported, learning motivation is an important, longitudinal factor that can impact long-term, sustained behavioural changes to be observed in other indicators; thus, for this particular indicator, studies with classroom-based, seminar interventions, but non-secondary-school-students as beneficiaries are referenced to relevant metrics, such as willingness to set financial goals, that can measure potential sustainability of impact, and relevance to the age group of the beneficiary (secondary school students). On top of this, however, while one of the two studies in the 8 that we used to identify potential metrics for the example has used credit scores and credit-related financial data as metrics to measure the impact of the intervention on borrowing, as do many other studies observing classroom-based interventions, we have decided to use metrics more general and robust, as the theoretical relevance of secondary-school students using credit cards and related loan services are less observed. Therefore, general reporting on money-borrowing activities and payment delays is used to measure the indicator for borrowing.

By following the rigour in data collection and scientific-endorsed metrics in the SIR stage, investors would achieve a more transparent, comparable, and scientifically sound dataset to analyse and communicate their portfolio's ESG performance. By tracking and reporting on youth-saving and financial management behaviour using a common metric

(KPI), investors can compare the impact of different interventions and identify best practices to adopt.

### 3.5 Stage 3. Signature Impact Additionality Assessment (SIAA)

In an ideal setting for impact measurement, interventions are assessed by running a randomized controlled experiment with at least two groups: a group of randomly selected beneficiaries receiving the intervention (the treatment group), and a control group that did not. By comparing the observed changes before and after the treatment within these two groups, these experiments called Randomized Control Trials (RCTs) allow us to quantify the impact an intervention achieves. However, RCTs are very costly, time-intensive and logistically challenging. For the ex-post assessment of impact, we thus recommend quasi-experimental methods that do not involve randomization but still use counterfactuals.

One widely used approach is the difference-in-difference (Diff-in-Diff) methodology, where a comparison is made with a similar population, namely one that is not offered the intervention but is receiving “treatment as usual”. Both groups receive pre- and post-assessments, and the difference between those assessments is used to determine the impact of the new intervention. A Diff-in-Diff test is aimed at estimating the causal effects of a given intervention on one or more impact KPIs identified in the SIP stage and will ultimately allow us to assess impact additionality.

A clarification is in order as far as the definition of additionality is concerned. The concept of additionality has been initially developed in the area of development finance to identify projects and investments that would have not occurred absent the specific intervention of institutions such as the World Bank, the European Investment Bank, and other Development Finance Institutions. Indeed, one of the key objectives of these multilateral financial institutions is to tackle market failures and provide capital often at concessionary terms to unbankable projects, and avoid the crowding out of private investments. In the impact investing field, impact additionality refers to whether the target outcomes would have occurred anyway, without the investment underlying the intervention. For this reason, the quasi-experimental test that we envisage represents a powerful tool for the Signature Impact Additionality Assessment (SIAA).

In what follows, we will present an application of the Diff-in-Diff approach that we recommend at the SIAA stage in the context of financial literacy.

The usual ToC establishes a link between financial education, financial literacy, financial decision-making, and economic outcomes. However, establishing the causal



impact of education empirically can be challenging, as financially illiterate households are typically poorer and less educated, making it difficult to isolate the effect of financial literacy from other factors linked to unfavourable financial outcomes. Furthermore, students enrolling in a course in financial education are more likely to belong to higher-income households. Endogeneity and selection problems need to be addressed to avoid biased estimates of the impact of financial literacy programs.

*SIU in practice: an example:*

Cole et al., 2016 exploit the exogenous variation in exposure to personal finance and math courses induced by changes in state-level curricular requirements and study whether the exposure to these courses had a causal impact on savings, investments, and credit management. The key assumption is that changes in state-mandated high school requirements are unrelated to household savings, and therefore behaviour changes following the mandate can be interpreted causally. The authors use the US census variable income from interest, dividends, net rental income, royalty income, or income from estates and trusts as a proxy for asset accumulation of a given individual, complemented by FRBNY variables on credit management: the credit score,<sup>3</sup> the proportion of an individual's credit card debt that is current, the proportion of quarters in which an individual has any delinquent credit card balance, a bankruptcy indicator, and a foreclosure indicator.

To address the “identification problem”, namely the challenge of accurately determining the causal relationship between two variables when there are other confounding factors at play, the authors rely on two natural experiments: the imposition of state-mandated high-school personal finance courses and changes in state laws regarding the number of math courses prompted by the publication of the National Commission Excellence in Education report, recommending three years of math courses. Prior to the report, no state required 3 years of math and many states responded by increasing the number of math courses required for graduation, though not always to the recommended levels.

The authors then estimate equation 1),

$$y_{isb} = \alpha_s + \gamma_b + \beta E_{isb} + \beta X_{isb} + \varepsilon_{isb} \quad 1)$$

where  $y_{isb}$  is a financial outcome, and  $E_{isb}$  is a dummy variable for whether individual  $i$ , born in year  $b$ , turned 18 after the mandate was implemented in his or her state of birth,

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<sup>3</sup>The credit score, similarly uses past credit management behaviour to predict the likelihood that an individual will be 90 or more days delinquent over the next 24 months.

s. In order to control for unobserved characteristics at the state level and over time trends, they include fixed effects for the state of birth,  $s$ , and year of birth,  $b$ , along with demographic control variables from Census Data,  $X_{isb}$ .

**Figure 10** presents results from equations (1). Column (1) presents the estimates for a linear probability model, with any investment income, a dummy variable equal to 1 if the household reports any asset income, as the dependent variable. The dependent variable in Column (2) is the level of total investment income, and in Column (3) it is the individual's location in the nationwide distribution of the ratio of investment income to total income. The outcome variables in Columns (4) and (5) are the value of all financial assets and equity in real estate, respectively. Panel A presents the estimates of equation (1), the difference-in-difference regression, displaying the coefficient on the dummy indicating an individual was exposed to the personal finance course. Similarly, Panel B presents the same coefficients for individuals exposed to the additional math courses. The estimated coefficient of the dummy  $E_{isb}$  is the average difference in the financial outcome variables between the exposed (treated) and not exposed (control) groups. For example, Column (1) in Panel A shows that being exposed to the personal finance course reduces the probability of reporting a positive investment income of 0.0025%, while Column (2) indicates that the average difference in the investment income between the two groups is actually -31.22 USD, and so on. Importantly, none of the coefficients is significant at the 5 percent level and, in fact, most of them are negative.

**Figure 10:** Estimates of the Effect of Increased Math and Personal Finance Mandates on Asset Accumulation

Dependent Variable:	Any Investment Income	Investment Income	Investment Income Percentile	Value of Financial Assets	Equity in Real Estate
<b>Panel A</b>					
Exposed to Personal Finance Mandates	-0.0025	-31.22 *	-0.06	411.96	1063.8 1
Sample Size	2,742,0 12	2,726,073	2,742,012	36,313	51,459
<b>Panel B</b>					
Exposed to Math Mandates	0.0016	2.06	20.32 **	-408.29	2138.27 ***
Sample Size	1,454,334	1,451,309	1,347,143	20,527	28,191

Numbers with \*\*\* indicate significance at the 1-percent level, \*\* indicates significance at the 5-percent level and \* indicates significance at the 10-percent level.)

Source: Adapted from “High School Curriculum and Financial Outcomes: The Impact of Mandated Personal Finance and Mathematics Courses”, Cole, S. et al, (2014)

Results in Panel B refer to individuals exposed to additional math courses. While the coefficients on the “exposed” variable in Columns (1), (2) and (4) are not statistically significant from zero, the coefficients in Columns (3) and (5) are significant at the 5 and

1%-level, respectively. In addition, the magnitudes of these effects are not trivial: having to take more math courses moves an individual 20 percentage points up in the distribution of investment income to total income and increases equity in the property by \$2,140.

From an SIAA standpoint, we conclude that in the context of this study, personal finance programs did not have any material impact on the financial outcomes of exposed individuals. Math courses, on the contrary, display economically and statistically significant effects that can be quantified by the reported estimated coefficients.

The SIAA stage allows the investor to measure with a high level of confidence whether the intervention achieved its ultimate goal and the extent of impact achieved. The investor could then use this data in combination with financial returns to assess the economic and social performance of the investee and identify possibly risk-return-impact trade-offs of its investment strategy.

Under some circumstances, SIAA will deliver impact measures that can be monetized. As in the reported example, beneficiaries of math courses experienced over the investment cycle an improvement in their financial wealth expressed in dollar terms which multiplied by the number of beneficiaries could provide a monetary estimate of impact. Investors could then use the actual investment amount to compute the impact multiple of money of social return on investment.

SIAA does not always deliver a monetary estimate of impact. However, in combination with the SIR analysis, it could provide a consistent set of estimated KPIs that would allow a meaningful comparison of impact achieved across projects in the same vertical.

## 4. CONCLUSION AND OUTLOOK

The evaluation of impacts in impact investing is a complex and multifaceted process that requires careful consideration of a variety of factors. While there is no one-size-fits-all approach to address the challenges of impact evaluation in the MEASA markets, a data-driven, rigorous approach such as SIF can be considered. By following the three-stage process proposed by the SIF, investors can not only predict the potential impacts of their portfolio, but also quantify and track the progress of their start-ups, and evaluate the impacts achieved over a predefined period of time.

Moreover, a proprietary database that is specific to a particular industry or vertical can be used to benchmark different companies within that industry and to conduct metadata and statistical analyses to evaluate the impact of investments in that industry. The results of these analyses can provide investors with a broader understanding of the

impact of their investments and enable them to make more informed decisions about where to allocate their resources in the future.

However, there are still challenges that must be addressed. One of the main issues is the lack of high-quality data. Most MEASA markets lack the necessary infrastructure and database to collect data and perform quasi-experimental evaluations. Without reliable data, it is challenging to accurately assess the impact of interventions. To tackle this issue, investors should encourage investee firms to collect data on agreed-upon key performance indicators (KPIs), while also obtaining third-party verification, and committing to conducting SIAA with appropriate control groups. This would help integrate SIF into the due diligence process.

Another issue is data comparability. If a standardized vector of key performance indicators (KPIs) is used in the same vertical, comparison across verticals becomes a challenge. Additionally, each startup and firm has its own economic and social agendas, and unique methods to deliver services and impacts. Standardization may not capture the nuances of these differences, and this can lead to inaccurate assessments, even within the same industry.

In spite of its limits, we believe that the proposed framework has distinctive features such as the extensive benchmarking to extant, reported evidence and the rigorous attempt to identify the genuine additionality of the interventions. By extending the SIF beyond the financial literacy sector to other industries, such as healthcare and environment protection, SIF can be streamlined and back-tested, facilitating the quality of impact investment globally and contributing to positive social and environmental change.

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## APPENDIX

### Appendix 1: Overview of key performance indicators used

<u>Indicators</u>	<u>Subjective Measures</u>	<u>Objective Measures</u>
(1) Knowledge	<p>Prospective financial behavior like</p> <ul style="list-style-type: none"> <li>● saving</li> <li>● investment</li> <li>● pension</li> <li>● bill payment</li> <li>● credit reporting and rating</li> <li>● emergency saving</li> <li>● budeting</li> <li>● consumption</li> </ul> <p>virtual behavioral prompt test on attitude towards credit confidence test on financial literacy topics</p>	<p>Standardized financial knowledge quiz based on correct / attempted in topics like</p> <ul style="list-style-type: none"> <li>● pension</li> <li>● financial literacy</li> <li>● budget</li> <li>● risk</li> <li>● financial markets and instruments</li> <li>● policies</li> <li>● numeracy</li> </ul> <p>job placement in the financial industry pass rate for relevant professional exams</p>
(2) Learning motivation		<ul style="list-style-type: none"> <li>● Intentions to change behavior participation in training program</li> <li>● Willingness to set goals, seek counseling</li> <li>● Continued utilization of fintech in dialy life</li> </ul>
(3) Financial earnings		<p><i>Individual</i></p> <ul style="list-style-type: none"> <li>● asset accumulation</li> <li>● income generation</li> <li>● employment status</li> <li>● portfolio fee annualized</li> <li>● long-horizon historical returns</li> <li>● number of funds held</li> <li>● fund diversification</li> <li>● standard deviation of fund</li> <li>● sharpe ratio of funds</li> </ul>

		<p><b>SME</b></p> <ul style="list-style-type: none"> <li>• profit &amp; loss</li> <li>• productivity</li> <li>• entrepreneurial index: product development, R&amp;D, certification application, expansion, etc</li> <li>• employees &amp; salary</li> <li>• number of clients</li> </ul>
<b>(4) Budgeting</b>	<ul style="list-style-type: none"> <li>• behavioral exercises practicing budget allocation</li> <li>• self reported spending controls</li> <li>• self reported levels of financial stress and comparison</li> <li>• shopping behaviors</li> </ul>	<ul style="list-style-type: none"> <li>• monthly expenses</li> <li>• use of formal / informal budgeting</li> <li>• knowledge on budgeting tools and skills</li> </ul>
<b>(5) Insurance coverage</b>		<b>purchase / take up of insurance</b>
<b>(6) Borrowing</b>	<ul style="list-style-type: none"> <li>• perceived intention, risk, and importance in credit and interest</li> <li>• survey outlining confidence with using credit</li> </ul>	<ul style="list-style-type: none"> <li>• credit rating</li> <li>• default / delinquency rate over time</li> <li>• usage of credit card / other forms of credit</li> <li>• frequency in credit payment</li> <li>• credit card debt</li> <li>• past / current loan applications</li> <li>• delinquency resolution</li> </ul>
<b>(7) Savings</b>	<ul style="list-style-type: none"> <li>• likelihood to enroll in pension (401k / IRA)</li> <li>• planning horizon</li> <li>• saving habit</li> <li>• psychological index on intentions to save</li> <li>• self-perceived level of savings and investments</li> </ul>	<ul style="list-style-type: none"> <li>• savings</li> <li>• contribution to savings</li> <li>• investment income</li> <li>• financial market participation</li> <li>• bank account</li> </ul>
<b>(8) Remittances</b>	<ul style="list-style-type: none"> <li>• control over remittance vs family influence</li> </ul>	